ALL MANNER OF MEN

By

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INTRODUCTION

> Men are born equal but they are also born different.
>
> ERICH FROMM
> *Escape from Freedom,* 1941

This book is about people, different kinds of people—all manner of men.

There has been no greater injustice shown the genius of the human race than the assertion that its members are 'all the same under the skin.' Arguments may rage among physical anthropologists about whether racial differences are simply the result of climatic conditioning, or chance mutations, perpetuated and accentuated within small breeding groups, or the outcome of miscegenation. They may argue about whether a race has to be defined in geographical or environmental terms, or even whether its boundaries can be realistically drawn at all; but all have to admit that we are, and shall probably always remain, different.

What concerns us in this book is *how* different we are; how deep-rooted in our evolutionary history are those variations in our physical appearance (our *phenotype*) and in our genetic constitution (our *genotype*), and how far do racial differences in anatomy and body chemistry extend to distinctive attitudes of mind and to the emotions.

If such a study is today unfashionable, lest by acknowledging that we are not all alike we thereby exacerbate social discord in mixed societies, our answer must be that half-truths are rarely satisfactory bases for permanent human relationships. To understand racial differences is to appreciate the true genius of the human species—variability that has given man his superiority in the natural world. Because he could adapt to a variety of different environments where lesser creatures perished through overspecialization to one particular ecological niche, man has been able to move freely throughout this planet and to settle in a wide variety of habitats.

Furthermore, to deny our differences, or to try to convince ourselves that they are less important than they are, is to risk stultifying by neglect those cultural traditions whose very diversity is an essential part of human experience. If at times differing attitudes and cultures have proved mutually incompatible and dangerously antagonistic, the way to harmony is not through refusing to discuss or even acknowledge racial diversity, but through probing its origins, geographical and genetic, and making a realistic assessment of its inevitability. The current fashion of minimizing racial differences in the name of social progress does nothing to stimulate research but merely nurtures prejudice and encourages bigotry. Unfortunately, hypersensitivity on racial questions is tending to remove the entire vital subject of ethnic variability from the area of public debate. Even the word 'race' appears to have become an anathema, and writers have been driven to invent euphemistic synonyms which do nothing but confuse the issues.

From the outset it should be understood in what sense the word 'race' is used throughout this book. It is primarily a zoological concept; it cannot properly be used to describe political or cultural entities, as is popularly done when people speak of 'the British race' or 'the Jewish race.' A race is, simply, a division of a *species* and, indeed, has a synonym in the word *subspecies.* A species is a division of a *genus* and can be defined, with some qualification, as a collection of animals that will, in favourable circumstances, breed together and produce fertile offspring (67;130). The human species is thus classified as *Homo sapiens* Linnaeus (or Linn., or L.), indicating that we are of the genus *Homo* and of the species *sapiens* ('knowing'). This denotation was given to us by the eighteenth-century father of botanical and zoological *taxonomy* (the systematic arrangement of organisms into their various *taxa,* singular *taxon*) Carolus Linnaeus (266).

Some authorities further define the species with a formal subspecific, or racial, classification, such as *albus* ('white'), and embrace under this designation the whole Caucasoid race, or *americanus,* in reference to the various indigenous populations of the New World. As is the case with most formal descriptions, neither name accurately describes or fully encompasses all members of the taxon concerned; the Caucasoid subspecies includes people of many colours, from the blond Nordic of northern Europe to some of the blackest people in the world in India and Ethiopia. The native Americans are of Mongoloid origin and include many peoples of such diverse aspects as the Plains Indians, the tribes of the Amazon forest, and the highly specialized inhabitants of the Andean *altiplano.* More commonly, the various subspecies of mankind are given 'popular' names, like 'Caucasoid' or 'Mongoloid,' and this is the fashion followed here. Again, these names are at best only approximately descriptive of the peoples concerned and their homelands.

There has been no universal agreement about how many races of man there are, or were. So much intermixing of genes has occurred at the margins of the old breeding territories that many of the distinguishing features that characterized their populations have become blurred as advancing technology allowed easier migration. This lack of agreement extends even more to *subracial* classification, that is to the identification and grouping of populations within racial areas, such as the Nordics, Alpines, and Mediterraneans of Europe, all of whom are of the Caucasoid subspecies (see Chapter Six).

Nevertheless, most authorities will agree that there still remain sufficient distinctive traits observable in geographically discrete groups to warrant their classification into separate taxa on both subspecific levels, race and subrace. We shall follow the broad grouping into five major subspecies that has for long enjoyed a large measure of support among anthropologists: *Caucasoid,* historically centred in the main on Europe and parts of Asia and Africa; *Mongoloid,* in China, Japan, Southeast Asia, and the New World; *Australoid,* in Australia; *Congoid,* in West-Central Africa; and *Capoid,* in southern Africa (see Chapter Five).

The first necessity in order to think seriously about the origins and variations of the human species is to try to see ourselves in some kind of temporal and zoological perspective. *Homo sapiens* is a member of the group of animals called *Primates,* one of eighteen *orders* of mammals, characterized by, among other features, having a four-chambered heart, breathing by lungs, having hair over their bodies, and suckling their young. Of the other seventeen orders, the Insectivora ('insect eaters'), which includes hedgehogs, shrews, and moles, comprises our closest mammalian companions.

The Primates are represented today by tree shrews, lemurs, tarsiers, monkeys, apes, and ourselves. The first three come under the *suborder* Prosimii ('pre-monkeys'), and the last three are grouped under the suborder Anthropoidea ('manlike'). The Anthropoidea divide into three *superfamilies:* Ceboidea ('like the Cebus'—a genus of long-tailed monkeys from South America), comprising New World monkeys generally; Cercopithecoidea ('like tailed apes'), monkeys from the Old World, which evolved separately from those in the Americas; and Hominoidea ('like man'). This last superfamily has two *families:* Pongidae, the pongids, or anthropoid apes, of whom the gorilla and the chimpanzee are our closest relations; and the Hominidae ('of the family of man'), whose only extant representative is man (Fig. 1).

In trying to determine our place in the zoological scheme we are greatly helped by the fact that the order Primates includes a series of living animals that represent stages in the evolutionary development of the whole order. The usual difficulty in trying to reconstruct the evolutionary history of most forms of life is that the evidence generally has to be chipped out of rock as fossils, all that remains of creatures living perhaps millions of years ago. It is amazing how much a *palaeontologist* (Greek *palaios,* 'ancient'; *onta,* 'things existing'), whose responsibility this is, can deduce from such skeletal remains, but, of course, far more information can be obtained by watching the living creature in its habitat, or by dissecting its corpse in a laboratory.

In seeking our own origins, we are able to compare in sequential order living specimens of the Primates, including the diminutive tree shrew, the lemur, tarsier, monkey, and anthropoid ape, as well as ourselves. Considering that our order has an honourable history of development stretching back to the Palaeocene epoch (Greek *palaios,* 'ancient'; *kainos,* 'new or recent'), some 60-odd million years ago (Fig. 2), the fact that so many of our cousins are still thriving today in various parts of the world says much for the resilience and adaptability of Primates generally.

Nevertheless, when making comparisons between these creatures, it has always to be borne in mind that they are the *terminal*

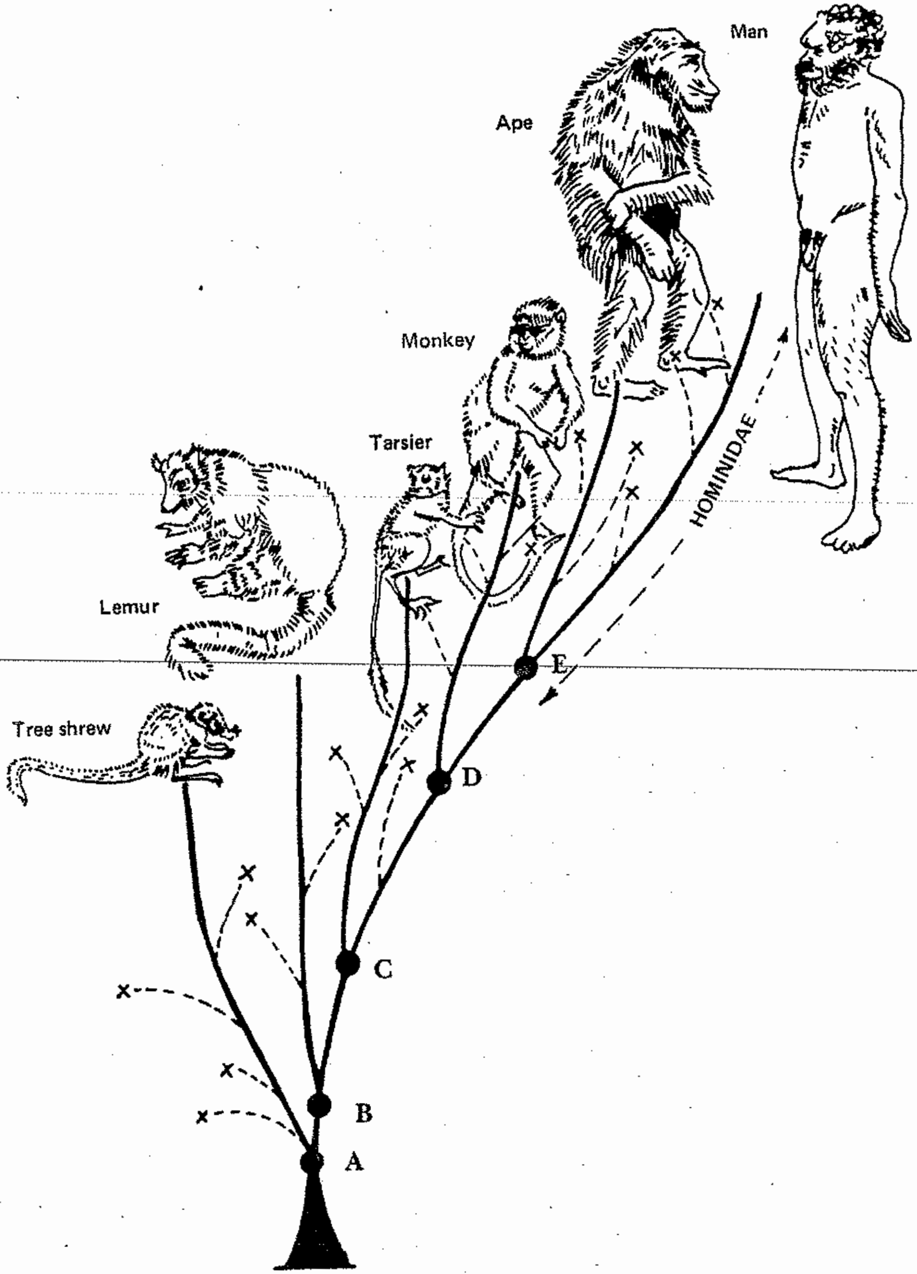


Figure 1. Diagrammatic representation of the living Primates in their series from tree-shrew to Homo. The sequence leads from the basal Primate stock through hypothetical transitional stages, A–E, at which the different ramifications of the Primates are presumed to have branched off. Fossil Primates approximating to the postulated ancestral stages are represented by crosses. (After W. E. Le Gros Clark, *The Antecedents of Man,* 3rd ed., 1971, p. 44, Fig. 4; p. 46, Fig. 5.)

CENOZOIC ERA (Tertiary period)	A	Palaeocene epoch	63m.-58m.	First primates
	B	Eocene epoch	58m.-36m.	Many modern types of mammals
	C	Oligocene epoch	36m.-25m.	Large running mammals
	D	Miocene epoch	25m.-13m.	Grazing mammals
	E	Pliocene epoch	13m.-3m.	Large carnivores
(Quaternary period)	A	Pleistocene epoch	3m.-11,000 yrs. ago	Northern glacials; early man
	B	Recent	11,000 yrs. ago -	

Figure 2. Geological periods.

products of many divergent lines of evolution; we cannot say that the modern monkey derived from the modern lemur, or that we evolved out of the modern gorilla. Also, fortunate as we are in having so many representatives of our Primate order running about alive and well, there have been many more types that did not survive the stresses of ecological change or the depredations of better-equipped competitors in their parts of the planet.

Of the Hominidae, only two genera are now recognized by most authorities: *Australopithecus* ('southern ape'), whose fossil remains have been recovered mostly from southern and eastern Africa; and *Homo*, a large-brained genus. One of the species of the latter, *Homo erectus* ('erect-standing man'), is also extinct, and the other seems at times to be doing his best to become so and thus prove Linnaeus's assessment, *sapiens* ('knowing'), oversanguine.

If we cannot trace the precise route by which the little tree shrew achieved his present form or, for that matter, the lemur or the monkey, we know even less about our own tortuous journey to manhood. Apart from studying, and occasionally carving up, our cousins on the Primate tree, or taking samples of their blood for testing, we must rely upon the researches of the palaeontologists. Despite their patient work there still remain gaps of tens of millions of years and whole sequences of evolutionary grades in our record, and it would be idle to pretend that we yet have more than the sketchiest idea of man's *phylogeny* ('family origins'). Nevertheless, it is evident that however close our relationships are to the anthropoid apes, our respective lines of descent parted company tens of millions of years ago, before our common ancestor had yet become specialized for life in the trees. The apes went one way, seeking safety in the branches of their forest homelands and adapting their bodies to swinging through the branches (*brachiation*), while our forebears remained on the ground and eventually learned to stand upright (16).

Some fossil evidence of these ancient ancestors of ours has come to light from the intervening epochs, and we gain the impression of rather primitively constructed apes, keeping their options open about whether to develop for a life in the trees like their cousins or to continue with a more challenging and ultimately more promising terrestrial existence. In fact, we have to wait some 30 million years for the first certain representatives of the 'family of man,' the hominids, and by then the world had entered the *Pleistocene* epoch (Greek *pleistos*, 'most'; *kainos*, 'recent'), better known as the Ice Age (Fig. 3).

The Pleistocene has also been called the Age of Man, for it is the most crucial period in human development. During its span of 3 or 4 million years, our forebears learned to stand erect and walk on two feet, to use tools, to speak, and to behave like rational human beings. In those areas not covered with ice, climatic and

	Alps	*North America*	
	Onset of cool period 3½–1½ million years ago		
Lower (Early)	Günz Glacial	Nebraskan	
	Günz-Mindel Interglacial		
Middle	Mindel Glacial	Kansan	*c*. 500,000 years ago
	Mindel-Riss ('The Great') Interglacial		
Upper (Late)	Riss Glacial	Illinoian	*c*. 100,000 years ago
	Riss-Würm ('The Last') Interglacial		
	Würm Glacial I	Wisconsian	*c*. 65,000 years ago
	Würm I-II (Göttweig) Interstadial		*c*. 40-50,000 years ago
	Retreat of the ice about 8,300 BC		

Figure 3. The Pleistocene epoch (Ice Age).

geological changes set the environmental scene for the formative development of this strange, ill-balanced creature who, for some brief span at least, would rule the world.

Man was probably born in Africa, but he was to come of age in hardier climes at the edges of the ice sheets that covered northern Europe. We should spend a little time tracing the main events of the Pleistocene, if only to give ourselves a chronological framework within which to set the hominid progression.

The alternating periods of freezing cold and warmer spells in the Northern Hemisphere, with their attendant fluctuations in climate elsewhere, largely determined our latter-day evolution and diversification. It was a time of geological upheaval as well as climatic extremes. Under the pressures of glacial movements and ice caps, the earth's crust buckled, new mountains formed, volcanoes erupted, and the sea level rose and fell with the glacial episodes by hundreds of feet. The evolutionary tempo of the world's fauna quickened in response to the climatic disturbances; the appearance of cold-adapted molluscs in previously warm waters was matched on land by the arrival of modern genera of subfamilies of horses, cattle, elephants, and camels.

No one knows for certain when the Ice Age began, or why it happened. The most probable cause is a disturbance in solar radiation, and the best estimates put the onset of the cooler climate between 1½ and 3½ million years ago. The gradual lowering of global temperatures finally led to the formation of ice caps and glaciers at the higher levels, and these then spread out for considerable distances over the lowlands. When the glaciers were at their maximum, it is estimated that at least 28 percent of the world's land area was covered with ice. At present, some 10 percent of the globe is under glacial ice, but 98 percent of this is in the distant higher latitudes of the polar regions. A single ice sheet, the Scandinavian, covered nearly half of Europe. It radiated outwards over the Netherlands, against the northern slopes of the Hartz and Sudeten mountains, over the plains of Russia to the Urals, and down the valleys of the Don and Dnieper. Much of Siberia was overspread by mountain glaciers and by a great ice sheet on its northwestern plain (Fig. 4). The Alps, the Caucasus, and the Pyrenees in Europe, and most of the high mountains on other

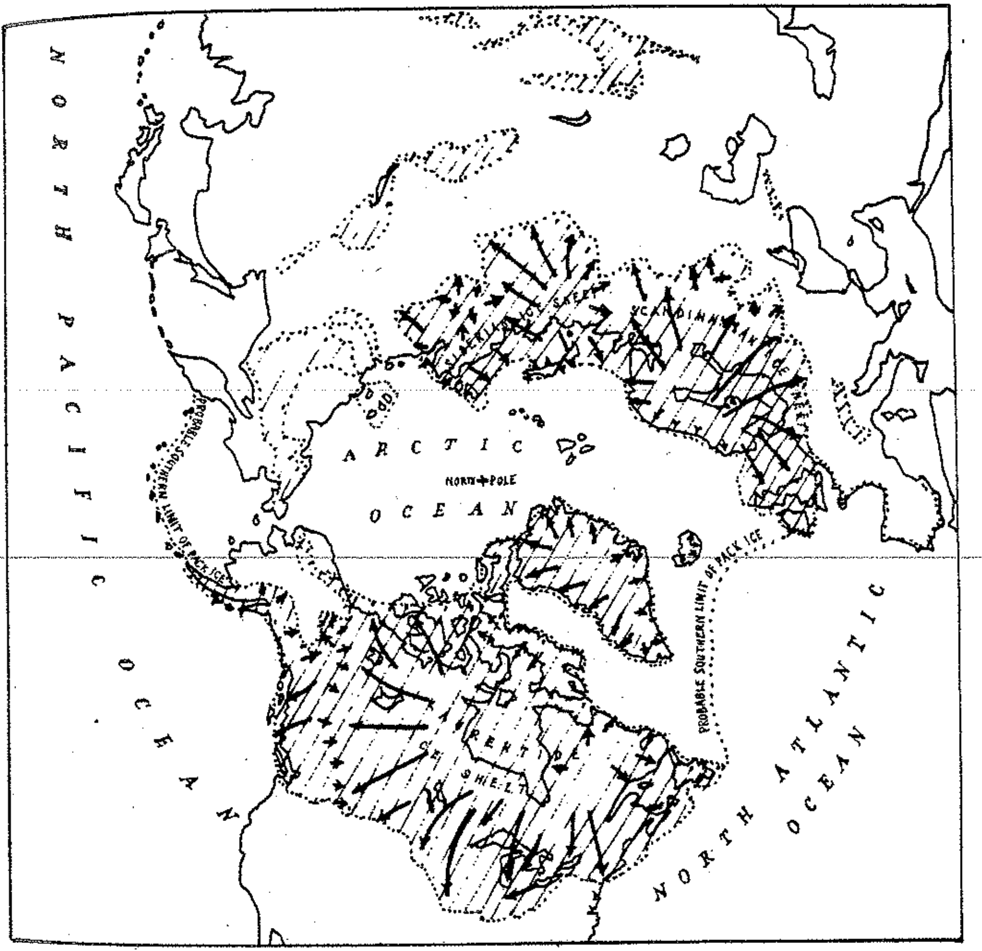


Figure 4. Pleistocene epoch: Northern Hemisphere, showing areas glaciated during the Ice Age. Arrows show principal directions of flow of former glaciers. (After *Encyclopaedia Britannica*, xviii, 1970, p. 45.)

continents carried glaciers. In North America, the ice sheet, unlike the ice masses of Europe, was mostly centred on low ground, and only in the West was it nurtured on high mountains. These vast, coalescing ice sheets flowed northward to the Arctic Ocean, and southward to form a group of massive lobes over the Great Lakes as far as St. Louis.

Although definitive dating of the onset of the cool period remains in doubt, there is more certainty over the sequence of glaciations and interglacial periods that characterized the Ice Age. There were four main glacial episodes, of varying length and severity, separated by periods in which the climate became warmer, and in some cases even subtropical. The sequences were first worked out in the Alps with mountain glaciers, and the local names given then in alphabetical and chronological order have persisted in literature: Günz, Mindel, Riss, and Würm, with their three interglacials: Günz-Mindel, Mindel-Riss (the so-called Great Interglacial), and Riss-Würm (the Last Interglacial) (320). The North American equivalent glacial periods are Nebraskan, Kansan, Illinoian, and Wisconsian (81;156).

Whenever the Lower, or Early (the archaeological levels at which the earlier traces of this period lie deeper, and are thus 'lower,' in the excavations), Pleistocene began, it is clear that it lasted considerably longer than all the remainder of the Ice Age, perhaps three or four times as long. It was not until the second part, the so-called Middle Pleistocene, beginning with the Mindel glaciation of perhaps ½ million years ago, that ice caps accumulated on the continental land masses. Prior to that, in the Günz period towards the end of the Lower Pleistocene, mountain glaciers formed in stream beds several times in different places, but the overall glaciation was not so severe nor so extensive.

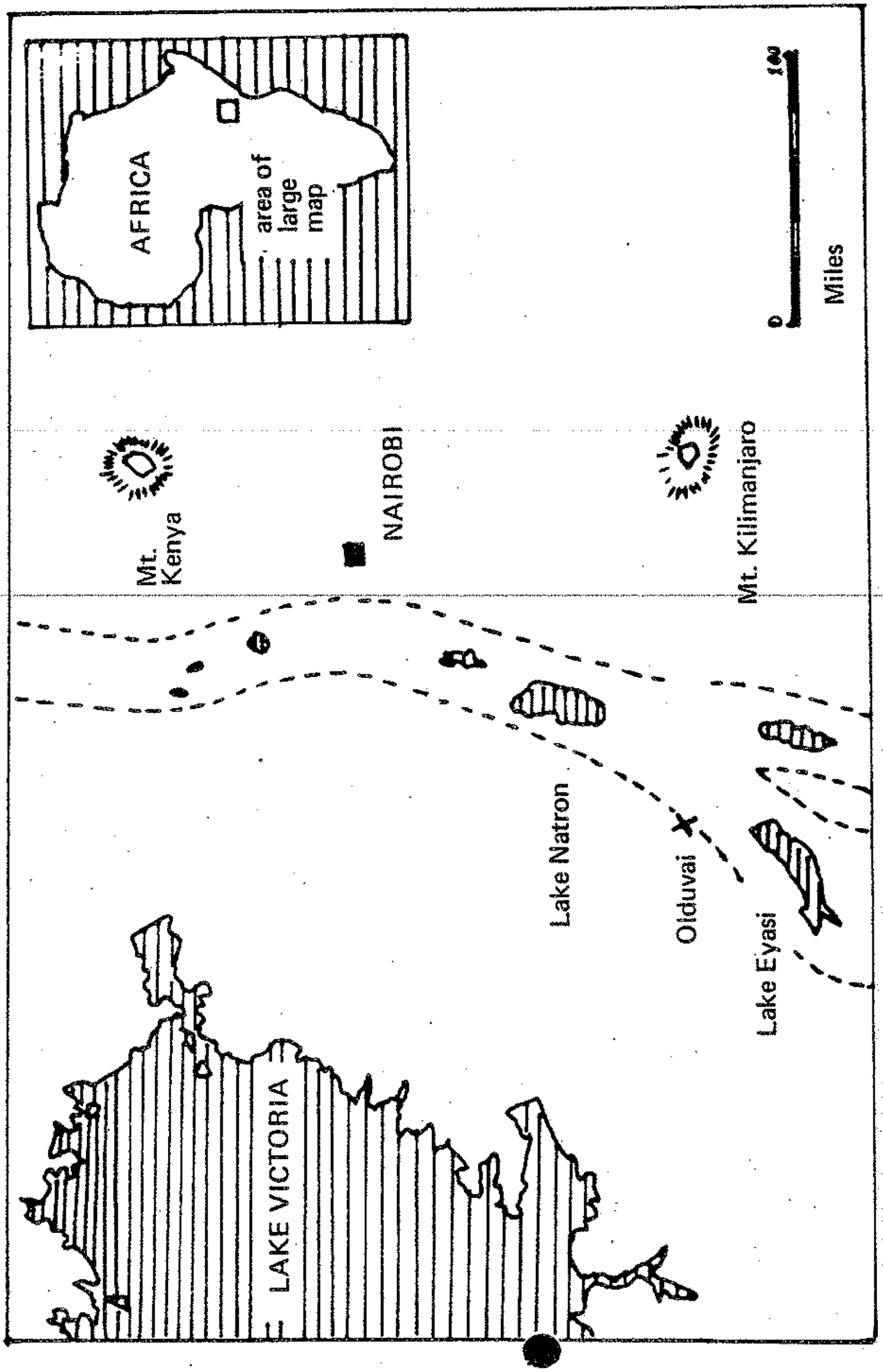
The major divisions of the Pleistocene have largely been distinguished on palaeontological grounds. Fossils tell their tale of cold-adapted animals coming down from the arctic, like the woolly mammoth, woolly rhinoceros, bison, reindeer, and musk ox. But the fauna they superseded indicate a warmer climate at the beginning of the Pleistocene and during the interglacials: the lynx, several species of bear, a macaque monkey, the great sabre-toothed cat, and the elephant. Even the hippopotamus lived in Europe during the Last Interglacial, and its remains have been found as far north as England. A cave lion inhabited Europe during the Middle and Late (or Upper) Pleistocene periods, and it was known to those early Stone Age artists whose sketches adorn the walls of caves in France and Spain.

If we accept the latest radiological dating for the latter part of the Ice Age, the peak of glaciation that introduced the Late Pleistocene, the Riss, occurred around 100,000 years ago, and the last major glaciation, the Würm, some 65,000 years ago. During that last period, before the final retreat of the ice, about 8,300 BC, there were several *interstadials,* that is, episodes of milder or cool weather between two peaks of glaciation, of shorter duration and less warmth than an interglacial. The first major interstadial, the so-called Göttweig, fell within the period 40,000 to 50,000 years ago.

Even where no actual glaciation took place on the planet, as in equatorial regions, the climatic fluctuations in the Northern and Southern Hemispheres appear to have had their effect in increased rainfall and reduced evaporation. One result was the creation of enormous inland lakes and the deepening and expansion of existing water courses. In Eurasia, the Caspian Sea and the Aral Sea to its east filled and overflowed at least three times, and the Dead Sea filled at least once.

Of more immediate interest from the point of view of man's fossil ancestors, these so-called 'pluvial,' or rainy, periods affected Africa in the expansion and dessication of former lakes. In particular, the waters of the Nile, which now run northwards into the Mediterranean, once flooded a series of shallow lakes inland, of which the Sudd Swamp and Lake Chad are the remains of two. These great stretches of water tempered the climate of the southern Sahara, which once teemed with game animals like those to be seen in the national parks of East Africa, where, indeed, some of the most important finds have been made (Fig. 5).

Buried deep beneath the Serengeti Plain in Tanzania lies the site of a brackish lake, once fed by streams flowing down from mountains to the south and east. On its edges hominids encamped, but for the most part their remains lie buried under hundreds of feet of volcanic ash and sand, and in the sediments of the lake itself, as successive rainy periods increased its area. However, in one place, rifting in the earth's surface some 50,000 years ago produced a series of cliffs over which swift rivers cascaded. The waters gouged through the accumulated deposits and exposed part of the old plain. This 25-mile *Olduvai Gorge* has proved to be the world's richest source of information about our hominid forebears of Lower Pleistocene times and, in particular, of *Australopithecus*



('southern ape').

When the first fossils of *Australopithecus* appeared in the 1920s, there was much discussion about whether the creature was an ape or a hominid (Fig. 6). On the one hand, anatomists pointed to such apelike features as the relatively small brain of about 600 cc capacity, no larger than a gorilla's, and the large jaw; on the other hand, more careful studies showed many manlike traits, such as the size and arrangement of teeth and the shape of the pelvis. This last feature was particularly important because it showed that *Australopithecus* habitually walked erect, or nearly so, and could use its forelimbs for carrying and wielding implements. Indeed,

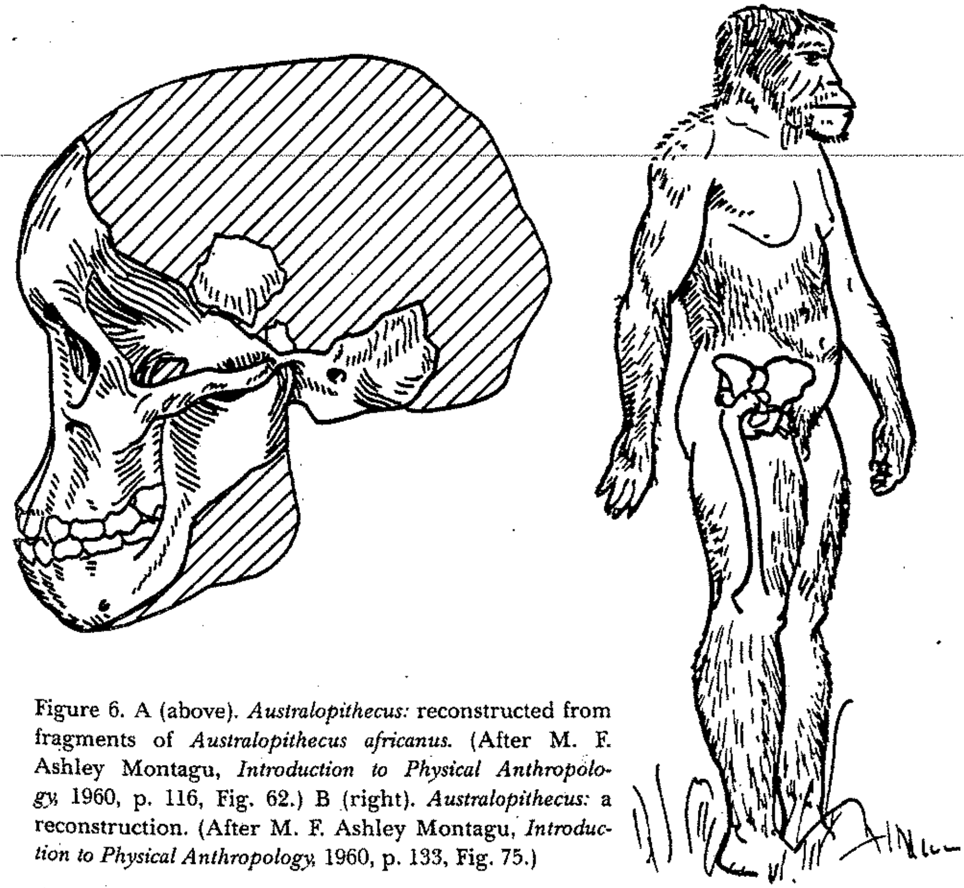


Figure 6. A (above). *Australopithecus:* reconstructed from fragments of *Australopithecus africanus.* (After M. F. Ashley Montagu, *Introduction to Physical Anthropology,* 1960, p. 116, Fig. 62.) B (right). *Australopithecus:* a reconstruction. (After M. F. Ashley Montagu, *Introduction to Physical Anthropology,* 1960, p. 133, Fig. 75.)

along with the fossils in some of the East African sites there were actually found crudely fashioned stone tools consisting of large pebbles roughly chipped on one or two faces to form a striking edge. Clearly this creature, however small its brain, was already thinking conceptually and might even have been able to articulate connected sounds in speech. If it could not yet be designated man, *Homo,* it was well on the way, and it represented a stock that had long separated from the pongid, or ape, family (335;336).

The genus *Homo* first made its bow on the palaeontological scene at the end of the nineteenth century in Java (139;247;225). It was first called *Pithecanthropus* ('ape-man') but is now generally acknowledged to warrant no separate generic title. The fossils came from strata that could be related to the second glaciation of the European Ice Age (Mindel). Despite its massive jaws and cranial bones, Java man, as the creature was popularly called, had a brain considerably larger than that of *Australopithecus,* at over 900 cc, coming even within the lowest range of *Homo sapiens.* Furthermore, the thighbone found in the initial deposit showed that Java man could walk perfectly upright, and this was expressed in the specific title bestowed upon him, *erectus* (280). Man had arrived, and, although still small brained by most modern standards, *Homo erectus* was to achieve a remarkable measure of success and global distribution before being finally ousted, or absorbed, by his more advanced successor, *Homo sapiens.*

Apart from the smaller brain capacity, the main differences between the two grades may be summarized as follows. *Homo erectus* had a smaller and flatter skull, with heavy brow ridges and a sloping forehead. His eye sockets lay largely in front of the braincase rather than below, as in *Homo sapiens,* and the projecting ridges of bone above them may have evolved to protect the eyes from blows; later they reverted to their former state with the development of modern man's more protuberant forehead (Fig. 7). The *erectus* cranium was long and broad at the base, converging towards the top, lengthways and sideways. Viewed from the rear, the skull is pentagonal in outline: widest at the base, sloping inwards and then more sharply to meet in a ridge in a middle line along the top. Our heads are more rounded, and the skull is usually widest from side to side well above the base, since our larger brains have to be encased in a smaller-based cranium. The occipital bone at the rear of the skull bulges out in *erectus* more than is normal in man and bears a sharp ridge for muscle attachment. The jaws are robust and project strongly (*prognathism*), but the lower jaw, the *mandible,* lacks a chin eminence. The palate of *erectus* is large, and the teeth are massive in comparison with ours, in some cases even coming within the range of those of *Australopithecus* (399). They also have a few very primitive features, including relatively pronounced canines, or dogteeth, with associated *diastema,* or gaps, in the upper dentition (see below). The nasal bones are broad and flat.

In contrast to the skull's primitive characteristics, the limb bones, as far as they are known, seem quite modern in aspect. It appears that by at least the beginning of the Middle Pleistocene, the limbs of our hominid ancestors had already reached a terminal stage in

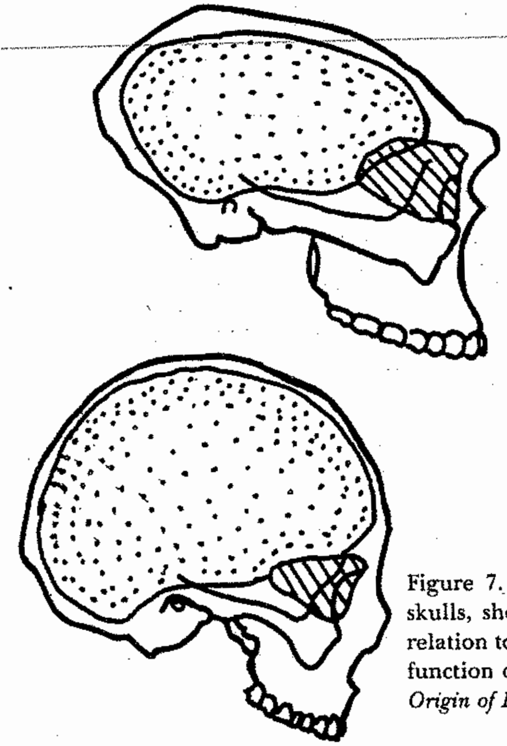


Figure 7. *Homo erectus* and *Homo sapiens* skulls, showing locations of eye sockets in relation to the braincase, and the protective function of brow ridges. (After C. S. Coon, *Origin of Races,* 1962, p. 350, Fig. 48.)

evolution; thereafter, progress towards man's estate was mainly confined to the skull, brain, jaws, and teeth.

Other *erectus* discoveries in the Far East followed those in Java. In particular, the largest group of fossils of this grade have come from China, in a cave near Peking, from which their type specimen has been named 'Peking man,' or more formally by his discoverer, *Sinanthropus pekinensis* ('Chinese man of Peking') (Fig. 8) (35). By 1937, the remains of some forty individuals had been found, including many isolated teeth, parts of the lower jaws, and pieces of fourteen or more skulls. Of the rest of the skeletons little is known, not least because Peking man had apparently been something of a cannibal; the skulls had been damaged to recover the brains, and the long bones had been broken open, presumably to recover the marrow (400). Associated with the fossils was a local Stone Age industry consisting of crude tools, largely of quartz. Most significantly, layers of ash showed that this community had discovered the use of fire.

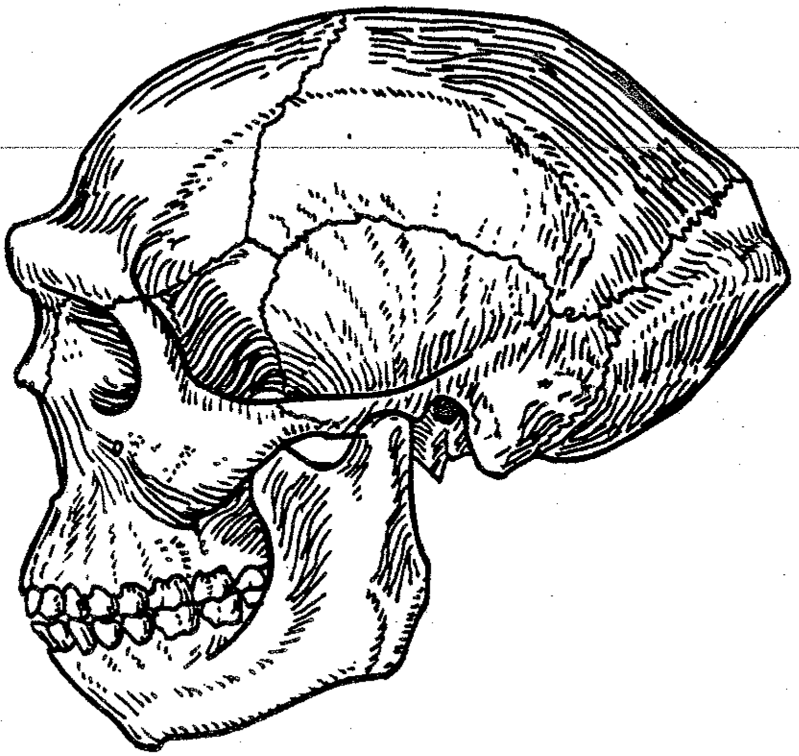


Figure 8. *Sinanthropus* (Peking man): a reconstructed female skull. (After M. F. Ashley Montagu, *Introduction to Physical Anthropology*, 3rd ed., 1960, p. 168, Fig. 84.)

Peking man comes probably from the middle of the second cold phase of the European Pleistocene (Mindel), about 360,000 years ago. Physically he appears less crude in aspect than the Javanese hominids; the braincase is higher, the face is shorter, and the brain capacity ranges from about 915 cc to 1,225 cc. Otherwise, the general construction of the skull and jaw is similar. His teeth are still larger than modern man's and have some interesting primitive features, a few of which have persisted into modern populations of human beings. For instance, around the crowns is to be seen a ridge of enamel, like a collar, or *cingulum.* This is a feature of some ape teeth and is one that also appears among modern Mongoloids. Peking man's incisor teeth also display a remarkable formation known as 'shoveling,' where the inner surface appears to be 'scooped out.' This same concavity is a marked feature of Mongoloid populations today (Fig. 9).

The clearly discernible evidence of progress in hominid evolution in the Far East inevitably raises the question of where and how the next stage, the transition from *erectus* to *sapiens*, took place. The advances in cultural aptitude, such as we see in the Chinese population of *Homo erectus*, reflect a corresponding increase in brain capacity, needed to accommodate and process all the new information forthcoming from improved sensory systems. The discovery of fire must have been a considerable spur to further advance. It offered security for campsites and a focus of social intercourse, as well as a portable source of warmth for extended hunting ranges into new, ecologically challenging habitats. All such stimulating experiences would have offered further advantages to more intelligent individuals and so would have encouraged their selection through the usual evolutionary processes. When the incidence of mutational change, perhaps involving no more initially than a single gene affecting the pituitary, or master gland (100:37), reached a critical level in a breeding population,

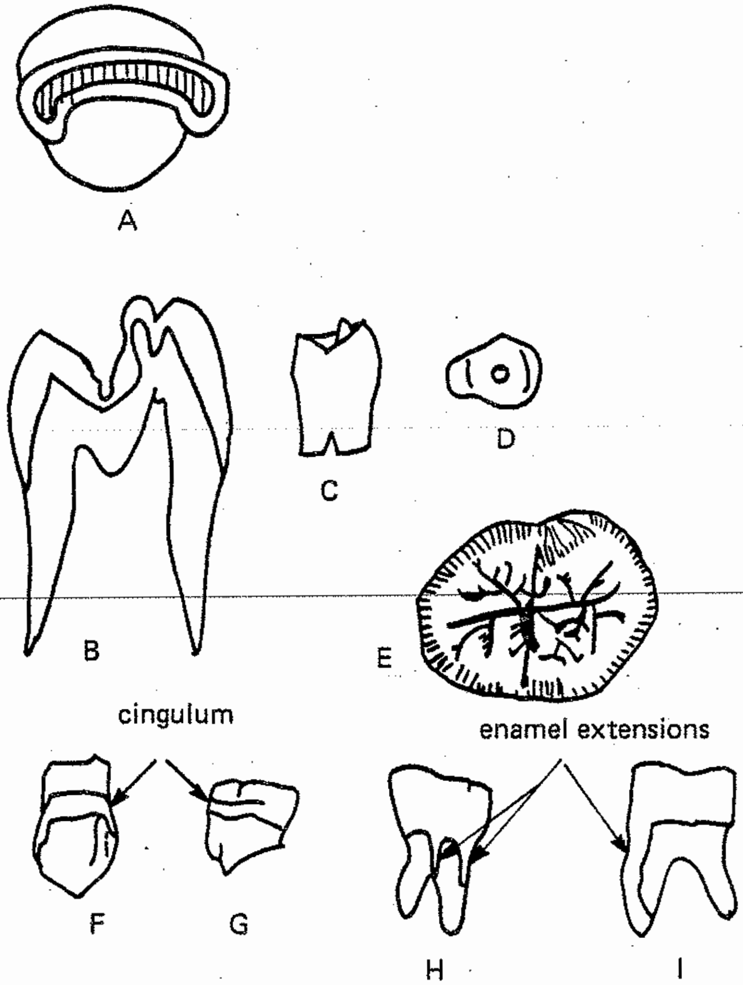


Figure 9. Dental peculiarities. A. A shoveled incisor, partly worn, seen from the occlusal view and greatly enlarged. B. The premolar cone: a first premolar of an American Indian (Mongoloid), in section and greatly enlarged. C and D. The same tooth, side and occlusal views, resp. E. Wrinkling in the crown of a third molar of Peking man. F and G. *Cingulum* in an upper canine and a lower molar, resp., of Peking man. H and I. Enamel extensions on the roots of molar teeth of Peking man. (After C. S. Coon, *Origin of Races*, 1962, pp. 355–58, Figs. 49–51.)

that group could be reckoned to have crossed the threshold of sapientiality.

Not all such populations would survive to exploit the change; some would fall foul of less favoured intruders sweeping through their territories in greater numbers, and others might have found difficulty in adjusting to the physical and mental stresses imposed upon them by their higher intelligence. But those who did outlive the immediate hazards would eventually prevail over their competitors by being able to think and plan ahead more effectively, and to design, fashion, and handle better tools and weapons.

Most authorities presume that the crucial change took place in one regional population and was transmitted thence by gene flow to neighbouring groups until the more advanced hominids either replaced or absorbed their less advanced cousins. This is the so-called *monogenetic* theory. However, it is by no means impossible that the transition occurred independently in more than one *erectus* population, any or all of which could have fathered the present races of man; that is, the *polygenetic* alternative (321;401;100). In that case, modern racial characteristics could have been already long established in the *genotype*, or genetic constitution, which each race inherited from its hominid forebears. That would imply that at least some of our racial differences are older than our species, and certainly some are so deep-seated as to suggest they represent a parallel development in widely separated regions, long predating the attainment of sapiential grade.

For instance, we humans can command a wide variety of facial expressions to supplement verbal communication. We raise or depress the corners of our mouths to indicate pleasure or disparagement, we wrinkle our noses to show distaste, pout our lips or draw them back, and so on, and some of the higher primates are similarly equipped. The mechanics of the operation depend upon the control of certain bundles of thin muscles derived from the *platysma*, the subcutaneous muscle sheath of lower mammals that enables dogs, for example, to shake themselves dry after a swim. Among the higher primates, including man, the platysma has been differentiated into separate fibres that respond to cerebral control.

Of the human races, the best equipped in this regard are the Caucasoids and the Mongoloids. But, most significantly, the muscles used are not the same in both groups. Each race developed its own set of fibres of the platysma to motivate the facial skin, and the patterns of movement are said to be entirely different. Furthermore, the muscle fibres in Mongoloid faces are much coarser than their European equivalent (101:257). These profound differences seem to indicate that the very early adaptation of a mammalian structure to serve this communicatory function must have evolved separately in at least two of the parent stocks of man, which, on that reckoning, parted company well before the invention of articulated speech in, perhaps, the Lower or Middle Pleistocene.

This kind of independent evolution in separate but genetically similar populations is a zoologically commonplace occurrence, not least among the primates. A particularly relevant example is the parallel development of monkeys in the Old and New Worlds. Despite their apparent similarities, there are, in fact, important differences between the two groups which show that they branched off from their common prosimian stock a very long time ago. After the *Eocene* epoch (Greek *eos*, 'dawn'; *kainos*, 'recent'), more than 30 million years ago, there were no land routes between the Old and New Worlds available to tropical arboreal primates. Yet both groups independently acquired stereoscopic colour vision and the ability to brachiate, that is, to travel rapidly through the trees by swinging from branch to branch. Significantly, they also paralleled each other in their progressive development of the brain, from small to large and from simple to complex convolution patterns (212;339;91:258).

The polygenetic proposition raises an interesting question about the relative seniorities of the various geographical populations of *Homo sapiens*. If, indeed, the transition to *sapiens* grade took place independently in several regional groups of *erectus*, there is no reason to suppose that the change would have occurred simultaneously throughout the inhabited world, from the Far East to the Atlantic. Some *erectus* populations would have remained in that grade longer than others, until such time as either they evolved independently or an influx of *sapiens* genes from the margins of their territories initiated the transition. That delay would have put them at a competitive disadvantage with more favoured communities and would have driven them to struggle for survival in some less promising habitat. There they would remain, mouldering in their backwater until absorbed or driven on still farther by fresh waves of culturally superior invaders.

It is perhaps to such a situation that we should look to explain the prolonged primitive *morphology*, or outward form, of some human races, like the extinct, specialized, so-called 'classic' Neanderthals of Western Europe, with their heavy-browed, chinless faces so strongly reminiscent of the pre-*sapiens* condition, despite their large brain size (see Appendix); or the present-day Australian aborigines, whose physical features are said to preserve more *erectus* features than any other extant group (see Chapter Eight) (20).

Evidence has been adduced to suggest that modern Mongoloid peoples owe significant aspects of their racial inheritance to the Chinese species of *Homo erectus*, Peking man, and that the Australoids are similarly indebted to Java man (401;100). But the Caucasoid, Capoid, and Congoid races are so hybrid in their origins that the attribution of their distinguishing features to identifiable hominid stocks must present greater difficulties. The fact is that, however the present populations of man achieved their *sapiens* grade, they are not now so genetically different that they cannot, at least in theory, breed across racial lines and produce fertile offspring, the acknowledged test of affinity between related taxa. To all intents and purposes, the opening words of the UNESCO statement holds true: 'Mankind is one . . . all men belong to the same species' (387).

CONTENTS

Page

Introduction v

Chapter

1. The Evolutionary Process 3
2. Infantilism 11
3. Manners Maketh Man 22
4. Togetherness 32
5. The Making of a Race 39
6. Caucasoids in Comparison 45
7. Flesh and Blood 59
8. Across the Great Divide 72
9. Africa 84
10. Mixing the Genes and Cultures 98

Appendix: Neanderthal Man and His Successors 114

Bibliography 127

Index 147

ALL MANNER OF MEN

Chapter One

THE EVOLUTIONARY PROCESS

> I can trace my ancestry back to a protoplasmal atomic globule. Consequently, my family pride is something inconceivable. I can't help it. I was born sneering.
>
> POOH-BAH in *The Mikado*
> W. S. Gilbert, 1885

Evolution proceeds by way of spontaneous mutations in the chemical composition of *genes*. These are the units of heredity, couriers of genetic information passed from generation to generation in the sex cells of all organisms. They consist of chainlike molecules of nucleic acids (deoxyribonucleic acid, DNA, in most organisms), whose remarkable property is that they have a structure that permits the 'messages' they contain, spelled out in the genetic 'alphabet,' to be transferred to their copies. A dividing cell will thus normally give rise to two daughter cells with similar chromosomes. Happily for the stability of genetic inheritance, the copying mechanism involved in cell division is exact, and deviations from the norm are rare enough to be countered by the innate conservatism of the reproductive process.

Spontaneous mutations are mostly harmful to an organism; it may have achieved a stability within its ecological niche over millions of years, and will resist change. Such mutations will then be selected against and come to nothing. Some may be neutral and continue for some time in the *gene pool*, the sum total of genes carried by the individual members of the population, until they disappear for want of some more positive incentive to remain (see below). The rare favourable mutation will produce a beneficial effect upon an organism and secure for it some advantage over its competitors, which in turn will enhance its chances of being inherited by the next generation.

But this whole process of random mutation is a vastly time-consuming and wasteful business, an economist's nightmare. It is hardly surprising that evolution through the normal processes of natural selection is a slow affair; during the short time in which man has been making scientific observations, very few evolutionary changes have been detected among animals and plants in their natural habitat. Charles Darwin had to rely for his theorizing on deductions from observed forms, living and fossilized, and their probable phylogenetic affinities. Nowadays, the experimental geneticist can engineer his own mutational changes in the laboratory, using small insects like the famous fruit fly, *Drosophila*, which will produce a new generation every fortnight or so. Or, even more conveniently, he will breed such bacteria as *Escherichia coli*, a harmless denizen of the human colon, which will give 10 billion offspring every twenty-four hours.

Naturally occurring, or spontaneous, mutations have no certain cause. The amounts of radiation affecting life on earth, from the softest X rays to the most penetrating gamma rays, are far too small in normal circumstances to account for the number of mutations occurring in nature. Some have sought to find a directing influence at work, urging organisms to advance inevitably towards increased efficiency. This somewhat optimistic notion, called *Orthogenesis* (195), has been variously formulated and its source attributed to differing agencies, external and internal, from divine Providence to environmental pressures. But, sadly, observed phenomena do not lend themselves to so reassuring a philosophy; the evolution of any species proceeds very uncertainly through many ramifications, most of which are short-lived and thus 'unsuccessful.' Even those forms that do prevail for any length of time must either succumb eventually to even better adapted successors or themselves develop features that will eventually dominate the organism and change it into a new species of contestants in the unending struggle for survival.

There is a temptation for observers to consider the evolutionary process only from the terminal standpoint of the 'successful' organism. They look back along the procession of fossil remains and construct a genealogical model in the form of a tree; one firm, clearly distinguishable trunk rises from the roots, and less successful genera and species shoot off on all sides as mere branches.

Looked at from this angle, for example, the story of the horse might seem to present a strong case for orthogenesis. At the foot of the tree in the Lower Eocene of some 60 million years ago, there is the fox terrier sized *Hyracotherium*. Then comes *Orohippus*, standing about sixteen inches high at the shoulder and living in North America during mid-Eocene times. The main stem then rises inexorably through successive geological levels, represented by the fossils *Miohippus*, *Merychippus*, *Protohippus*, and *Pliohippus*, gradually increasing in size, reducing the digits of their fore and hind limbs from the primitive five to one, lengthening the face, adapting teeth and neck to grazing, and finally appearing in a cluster of growth at the top of the tree as the modern Equidae, zebras, asses, and horses.

Thus portrayed, the picture might indeed appear a heartwarming example of cosmic planning, but a more realistic consideration of all the fossil evidence gives the impression more of a tangled bush than a tree. From one side a branch extends sideways at the level of the Upper Miocene, divides repeatedly at Pliocene and Pleistocene levels, and leaves a single twig to struggle on up to the present time (360). In other words, there is no single line of development; organs increase in size, become modified in different species and genera, and then shrink away and disappear altogether in subsequent populations. There has been no prevailing trend in body size, in comparative lengths of limb bones, or in dentition. In fact, as with evolution generally, the development of the horse has been purely opportunistic (361).

Granted, then, that mutations in nature are spontaneous, it is important to know the probable rate of change to be expected in living organisms, particularly human beings. Some attempts have been made to measure the incidence of mutation in human genes where they result in specific abnormalities. For example, a survey was made among newlyborns in a Copenhagen hospital of the occurrence of a kind of dwarfism called *achondroplasia*, or *chondrodystrophia fetalis*. Of 97,075 births, 10 babies were found to be suffering from this deformity. Two of them had inherited the condition from similarly affected parents, but the parents of the remaining eight children were quite normal in this respect, and, indeed, this is usually the case with the incidence of achondroplasia. The mutation must therefore have been a newly arisen, spontaneous aberration in the sex gland of one or other of the parents. From such observations it is possible to estimate the likely mutation frequency in human sex cells for this condition to about 4 in 100,000 cells, or 1 in every 10,000 births (131). Different frequencies have been projected for other, similarly occasioned pathological conditions, for there is no constant mutation rate for all human genes.

Furthermore, in the case of achondroplasia, we are dealing with a *dominant* gene, that is, one whose effects are transmitted to the children even though only one of the parents is a carrier of the mutant. The much·commoner *recessive* gene, on the other hand, will show itself only if both parents are carriers and form what is called a *homozygous* ('similarly paired') union, as distinct from the *heterozygous* ('dissimilarly paired') combination of two unlike parental organisms. It is therefore much more difficult to recognize a recessive gene, since it will only manifest itself in a double dose, and normally heterozygous carriers remain undetected. That is why the kind of inbreeding experienced in European royal families and in similarly restricted breeding isolates has often proved dangerous; there is more chance of homozygous mating and the incidence and perpetuation of genetic abnormalities.

According to some estimates, the number of potentially harmful mutants that are occurring continually in our genes is about 10 percent, which is disturbingly high. If such a large proportion of sex cells carry a newly arisen mutant in every generation, then it seems remarkable that there are so many 'normal' children born in a world population of over 3 billion persons. Apparently man has reached a kind of genetic equilibrium, where the accumulation of harmful mutations that arise naturally in every population of sexually reproducing organisms, what the geneticists call its *genetic load*, is balanced by those eliminated in the normalizing process of natural selection. But it is a fine balance, and the conservationists are right to draw our urgent attention to the reckless introduction into the ecological system of new toxic substances, or to our increasing the planet's background radiation, with the dangers that these actions present to our genetic equilibrium.

The world's human population has a limited gene pool, for, by definition, our species cannot exchange genes with another, however closely related. Interbreeding is only possible with other human beings, so that we cannot dilute our accumulated load of harmful mutations by spreading it beyond our kind. An effective mutation anywhere in the world where interbreeding is possible will spread to remaining areas if it is not soon eliminated by the screening processes of natural selection. Such genetic flow, after all, is how evolutionary changes have spread through breeding communities in the past, transforming, for instance, our hominid ancestors into *Homo sapiens*. This we would regard as an evolutionary 'advance' and find it welcome; but it is as well to remember those other species, genera, and even families of animals whose evolutionary 'advancement' in the past made them too specialized to survive subsequent changes in the ecology of their habitats and condemned them to extinction. Man owes much of his success in the proliferation of the species—if 'success' it turns out to be—to his extraordinary adaptability to changes in climate and food supplies, and, where natural resources are insufficient, to the ability to supplement them with the devices of his own creative imagination.

Racial diversity has contributed in no small measure to this adaptability. Each population has specialized to its own habitat, physically, by evolving in ways best suited to meet the exigencies of the environment, and culturally, by adopting a way of life that makes the best use of available resources. Where conditions changed beyond the margins of even human resilience, man's reasoning powers and cultural advances have enabled him to migrate and seek more tolerable conditions elsewhere. Once he settled in his new homelands, miscegenation with indigenous populations has contributed new blood to local breeding stocks and has generally enriched the mutational potential of the human gene pool.

Separate racial development has thus provided the continuing source of genetic adaptability in man, and one might be deluded into thinking that by now we must have in our reserves sufficient resources to meet almost any kind of environmental emergency; that however much we may upset the balance of nature or poison the atmosphere, the human organism will always adapt to meet the new situation and survive. Unfortunately, the evolutionary processes are not so accommodating and are not party to any such pact of human inviolability. In practice, we are limited to changes that the physiology of the system in general can accept; an innovation, however advantageous, that upsets the delicate balance of the body must be rejected. The chances of favourable mutations occurring in all the affected genes at the same time, and combining to produce an organism that happens to fit some radical change in the ecology or social pattern, are infinitesimal. We can only be amazed that such a random process as natural selection allows any advance at all. The fact that it does, given time, is some indication of the range of opportunities for change offered by a system of sexual reproduction.

It is also a warning against expecting too much, too quickly from nature; evolution works on a 'one-step-at-a-time' basis. An overspecialized adaptation in one part of an organism can seriously upset arrangements elsewhere, as our plant and animal breeders have often found to their cost. It may be amusing to dream up science fiction characters with some disproportionately developed mental or physical faculty, or set competitions for devising 'improvements' that could enhance man's evolutionary endowment, but any real-life genetic engineering we may be tempted to make on our own initiative is likely to do more harm than good and might well prove disastrous. The human body is an extremely complex organism with more than its share of inherited anomalies already. It could become even more unbalanced if we were to start mixing parental genes with the idea of producing in our children some real or fancied advantage, or generating some kind of 'superrace.' It is more likely that we should enlarge in our progeny the already overextended area of potential physical and emotional stress.

Man is, after all, the product of several billion years of evolution, working largely through the haphazard reaction of living organisms to their environment. What has emerged so far as creation's highest achievement is still in many respects a very unsatisfactory mechanism, whose various parts have not as yet become fully integrated. The miniature computer we carry insecurely perched on top of our spinal column makes impossible demands on the rest of the body. Not only is it extremely expensive to maintain in terms of calories and blood supply, but its speed of development has far outstripped the capability of our anatomy to respond to its wishes. Our hominid forebears hardly had time to accustom themselves to balancing precariously on their hindlegs before their dawning intelligence was sending them off exploring the planet and subjecting their delicately balanced temperature control systems to the extremes of alien climates.

We shall be noting some of the ways in which the various races have adapted their bodies to suit their environment in this respect, but in the main we are all remarkably resilient to climatic fluctuations, considering the very narrow margins of tolerance allowed by our physiology. Nevertheless, the need to maintain overall temperature control despite man's migratory restlessness has posed a real and largely unresolved biological problem for the human body.

One way we lose surplus heat is by sweating profusely, allowing the moisture to evaporate from our naked skin and reduce its surface temperature. The *eccrine glands* responsible for secreting this perspiration had originally more to do with lubricating points of contact, like palms of hands and soles of feet, than keeping cool. The lubricants prevent the flaking of the dead horny cells which constitute the skin's outermost layer and improve its sensitivity. Thus cats, dogs, and rodents, have eccrine glands only in their paws; some South American monkeys have them to moisten the hairless gripping surface of their prehensile tails; and gorillas and chimpanzees are so equipped on the backs of their hands, since they use their knuckles for support when walking on all fours.

Man has seized upon this lubricating device to cool himself and has between 2 and 5 million eccrine glands distributed over his body, averaging 150 to 340 in every square centimetre of skin surface. We do not all sweat at the same rate, but we are capable, if necessary, of releasing up to three pints of liquid over our bodies in one hour, to a total of twenty-one pints in a day. This is a remarkable evolutionary adaptation of an existing facility to achieve a vital control of body temperature, but it has also been described as one of nature's 'major biological blunders' (290;291). The fact is that the liquid so profusely exuded from our pores carries with it to waste sodium and other essential electrolytes needed by the body's chemistry. As every athlete knows, unless these salts are speedily replaced, the deprived support system reacts violently and painfully with giddiness, nausea, vomiting, and severe cramps. Thus, nature has in effect extended the adapted system up to and beyond the limits imposed by the rest of the body's capabilities. Unless man, by his own intelligence, voluntarily restricts his overheating by keeping out of the sun or reducing his work load, he will quickly outstrip the recuperative powers of the system. If he persists in letting his body deprive itself of its vital minerals, he must compensate for their loss by cultural means, that is, by dosing himself with salt tablets or the like.

To summarize: genetic mutations can be good, bad, or neutral. Most are bad for an organism that has achieved an effective balance with its environment. Neutral mutations may persist in a population's gene pool and offer alternative means of dealing with new situations that might otherwise threaten the viability of the species. Bad mutations will normally be rejected through the processes of natural selection; the affected individual will die before it can reproduce itself. If the mutant gene is only recessive, not dominant, it may remain in the gene pool for some time, adding to the population's genetic load and offering a perpetual threat to its stability. If the breeding group becomes too small or culturally restricted, the chances of homozygous matings of two 'carriers' are thereby increased, with the resultant abnormal offspring affecting the viability of future generations and the population's survival.

The human species has benefited from its racial diversity by building a gene pool of many variables, potentially able to accommodate a wide variety of environmental situations, given time. But sudden changes in the planet's ecology are not easily tolerated, since the human organism can only accept changes in one part that are acceptable to the whole. We are already in a precarious state of imbalance, thanks to an overdemanding brain, and any further changes in the system, by mutation or cultural conditioning, could imperil our physical and emotional stability. Furthermore, genetic mixing for the sake of producing some putative advantage in future generations could prove equally hazardous to the long-term viability of the species.

Chapter Two

INFANTILISM

> Except ye be converted and become as little children. . . .
>
> MATTHEW 18:3

It is a fundamental principle of biology that the more elaborately constructed forms of life have evolved out of simpler organisms. So it would not be unreasonable to suppose that traces of those primitive stages in an animal's ancestry might reappear during the course of its foetal life. To some extent this does happen, and this phenomenon is called *recapitulation.*

Recapitulation had been noticed even before Darwin published his epoch-making studies on evolution in 1859 (118). A number of observers had been surprised at the similarities they had detected between embryos taken from the wombs of higher animals and fully-grown specimens of their more primitive relations on the evolutionary tree (281;18;5). Once Darwin had demonstrated the validity of the idea of evolution, more and more biologists looked for, and found, traces of earlier forms in the embryonic stages of organisms (Fig. 10).

For example, it is well known that in the pharyngeal region of a mammal still in the early stages of its life in the womb, careful examination will reveal traces of the gill arches, relics of the fish stage of its evolution. It is worth recalling that mammals form a class of the animal kingdom whose *phylum*, Chordata, also encompasses fish, amphibians, reptiles, and birds, in that order of evolutionary development. Later in the mammal's foetal life, those primitive gill arches become reorganized to form quite different anatomical structures more suitable to its life on land, like the framework of the larynx and its muscles, facial musculature, ossicles of the middle ear, and so on.

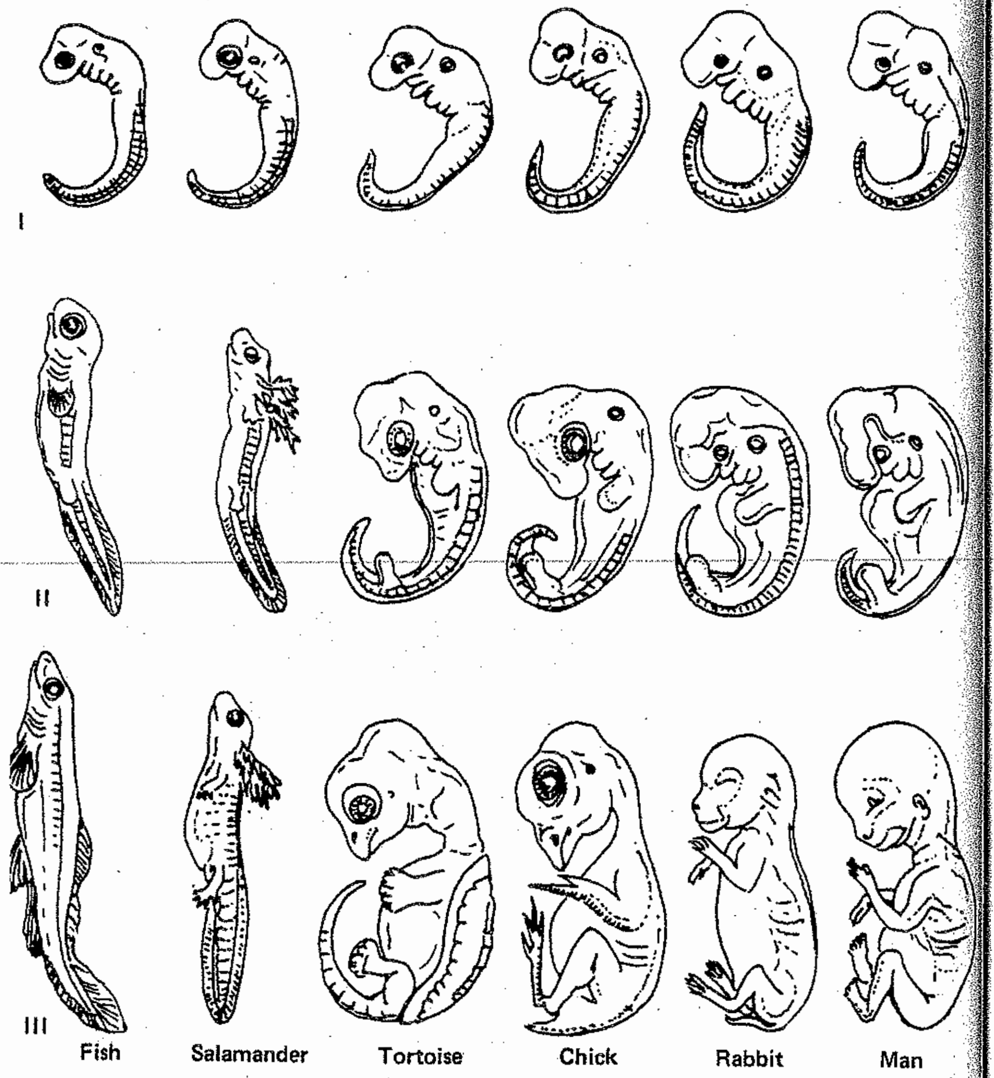


Figure 10. Comparison of vertebrate embryos. (From G. J. Romanes, *Darwin and After Darwin.*)

Not surprisingly, the idea that by examining the growing foetus at every stage of its development the observer could reconstruct elements in the animal's evolutionary past was an exciting concept which attracted a good deal of popular speculation in the heady days of the post-Darwinian era (196). The layman of that time could have been excused for thinking that were he to examine minutely the human foetus over its nine months in the womb, he would see successively reproduced a fully developed representative of each stage of man's evolutionary history, from fish to *Homo sapiens.*

Alas, the truth is rather less obvious and dramatic. We do, indeed, pass through many stages of our evolutionary past in the womb, and some of these reminders of our animal heritage we carry with us into adult life. For instance, we still have the rudiments of a tail, but it no longer protrudes; like other apes, we tuck it away into the floor of the pelvis as the nodules of the coccyx at the end of the spine. But in general, those foetal reminders of an animal's past are to be recognized not by comparing them with fully matured, adult representatives of more primitive forms of life, but with their embryos.

Two organisms may appear to be quite different in form and function but may share a common stock going back millions of years. It is only when one sees these creatures in their embryonic stage that their relationship becomes evident, and in the womb or larva they appear remarkably similar. The point of divergence can be quite late in their foetal growth, but in the short period between the time of differentiation and birth, the more evolved organism will begin to develop its special features and emerge a more highly organized animal.

Another important point is that the timetable of foetal development may not properly reproduce evolutionary chronology; thousands of generations and whole stages may be skipped and go unrepresented in those months of gestation. For example, some limbless amphibians, although descended from four-legged ancestors, show no trace of limbs throughout their embryonic life; thus, merely studying the developing embryo would of itself give no clue to the reptilian stage in the animal's evolutionary history.

Again, the appearance of a feature early in foetal development does not necessarily imply for that structure a corresponding antiquity in the animal's evolution. The Manx cat, famous for having no tail, can be distinguished from other cats very soon in its embryonic life, during the process of segmentation of the spinal column. But we should certainly not be justified in assuming from this observation that the evolutionary independence of this comparative newcomer to the feline scene extends far back to the initial stages of vertebrate history (91:23).

Furthermore, between two closely related animals there may be important differences in the spacing of comparative features during their foetal life, or in the duration of their retention. They may both go through the same phase of foetal development, but at the point of birth, one may still possess those primitive features and carry them on into postnatal life, while the other has already passed through that stage and emerges looking much more mature by comparison. This process by which foetal or juvenile traits are retained into adulthood is known as *neoteny* (Greek *neos*, 'young'; *teino*, 'stretch out, extend') (249;31), or *paedomorphosis* (Greek *pais*, *paid–*, 'boy'; *morphosis*, 'shaping') (176), and is a phenomenon to which we shall have to refer frequently. It is generally believed that neoteny has played an important role in man's development and that some of our distinctively hominid features are the result of retaining primitive forms into adult life. At first sight this seems to be a strange reversal of evolutionary principles of progression, from simple to complex, and certainly it should make us beware of ascribing all apparently 'primitive' forms to backwardness or relative immaturity. The fact is that by holding back on some aspects of development an organism can sometimes leave the door open to a more specialized adaptation and so set off on a new and more profitable line of growth (205).

The infant orangutan is born into the world with a large head that is already more 'adult' than that of the human baby (Fig. 11). Our infants have much of their cranial and brain development to accomplish after they are born—an example of human 'retardation' for which the narrow-pelvised human mother can give fervent thanks. Among the great apes, the major part of the brain's growth is achieved by the end of the first year; the human brain has nearly to double in size during the first three years, and not until the child is six will it have achieved a brain of virtually adult size and weight. Even then the organ must keep on developing until the individual reaches adulthood.

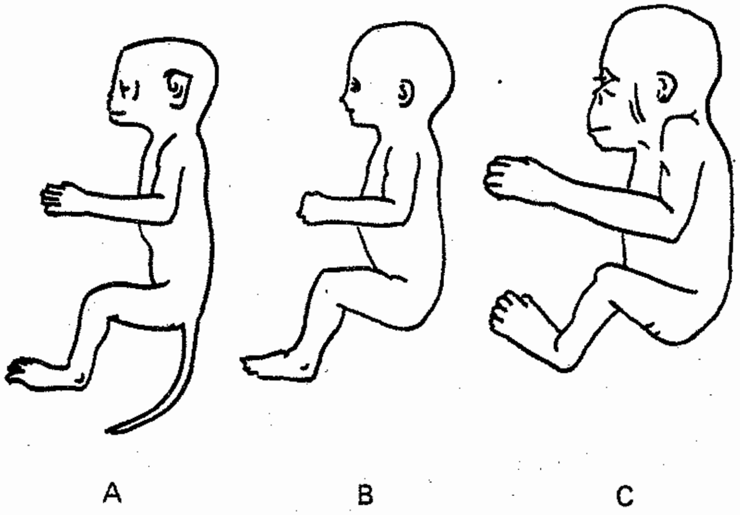


Figure 11. Body proportions of newborn Primates: A. Macaque; B. Man; C. Orangutan. (After A. H. Schultz, *Quarterly Review of Biology 1*, 1926, 465–521.)

The human braincase allows for this expansion by keeping open the serrated lines of articulation between skull bones, the so-called *sutures*, until the individual is in his twenties (Fig. 12). If, through some pathological cause, the sutures should unite in early childhood, that person will remain mentally retarded all his life. In the apes, on the other hand, the sutures begin to close within the juvenile's first few years.

This continuation of cerebral growth outside the womb is probably the most important example of human neoteny, for it gives the brain time to assemble and organize the myriad of nerve cells and nerve tracts necessary for its uniquely complex functioning (241). Another neotenous character affecting the head is one of stance. In the foetus of all mammals and most vertebrates, the axis of the head forms a right angle with that of the trunk. In the later stages of foetal development in all mammals except man, the head is brought back so that it comes more into line with the spine, an obvious necessity for an animal standing on four feet and habitually looking forward (Fig. 13). Man, however, retains the orientation of the foetus, his face pointing in a direction at right angles to the axis of the body, since, unlike the quadruped, he stands erect.

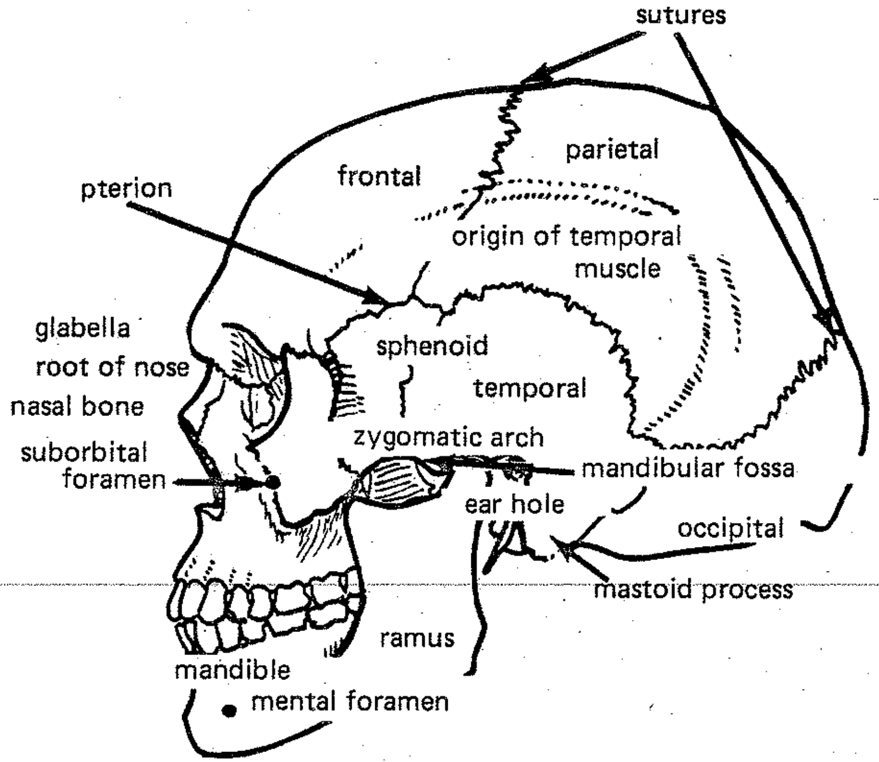


Figure 12. The human skull.

Man, even when adult, is remarkably 'baby faced' compared with the ape; he has a flat face, which presents a more or less straight profile from brow to chin. This aspect, called *orthognathy* ('straight jawed') contrasts with the *prognathy* ('forward jawed') of the adult ape, but, again, it corresponds much more closely with the pongid foetal condition and must be considered a neotenous feature in man (Fig. 14).

In the matter of our teeth we are infantile, compared with the apes and some of our hominid ancestors. The prolonged toothlessness of our babies is a retention of their foetal state, and even when our permanent teeth have put in their delayed appearance, they are more like the deciduous, or milk, teeth of the great apes than their permanent dentition. Even our hominid ancestor, *Australopithecus*, matched our teeth more in the deciduous form than the

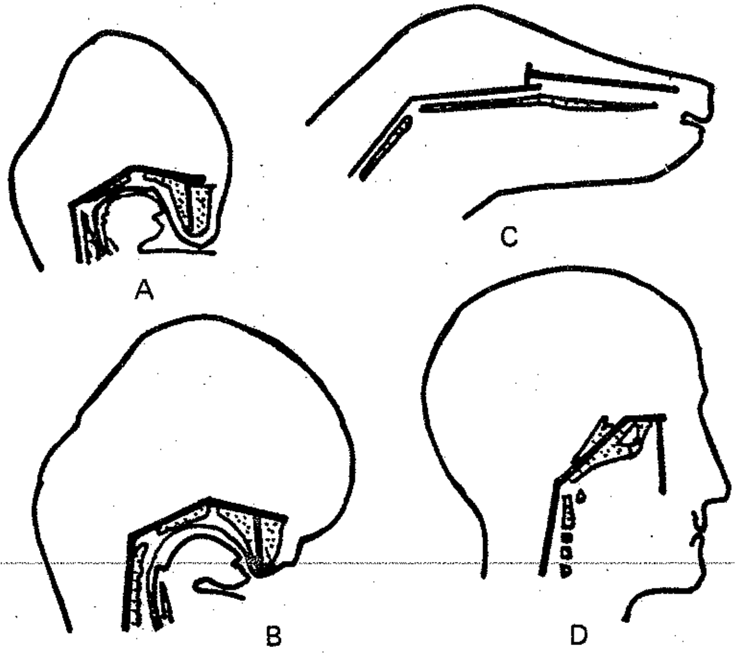


Figure 13. Sagittal sections through the head showing the angle the head makes with the trunk in (A) Embryo dog; (B) Embryo man; (C) Adult dog; (D) Adult man. (After M. F. Ashley Montagu, *Introduction to Physical Anthropology*, 1960, p. 299, Fig. 163.)

permanent.

Most human babies quickly dispense with the foetal hair, or *lanugo*, with which they are born. The infant monkey appears from the womb fully covered with hair; the baby gibbon has it only on his head and back at birth, leaving the rest to grow out later. In the gorilla, a much closer relative of man, only the head of the infant is covered, and the full coat appears some time later (39;31). For the most part we remain naked (probably because it suits our temperature-controlling mechanism), although the races differ in degree in this respect. Where we do all grow tufts of hair at puberty, particularly in the armpits (*axillae*) and around our genital organs, its function has more to do with disseminating our body odours than keeping us warm. Like other mammals, we can indicate extremes of emotion, like fear or sexual excitement, by

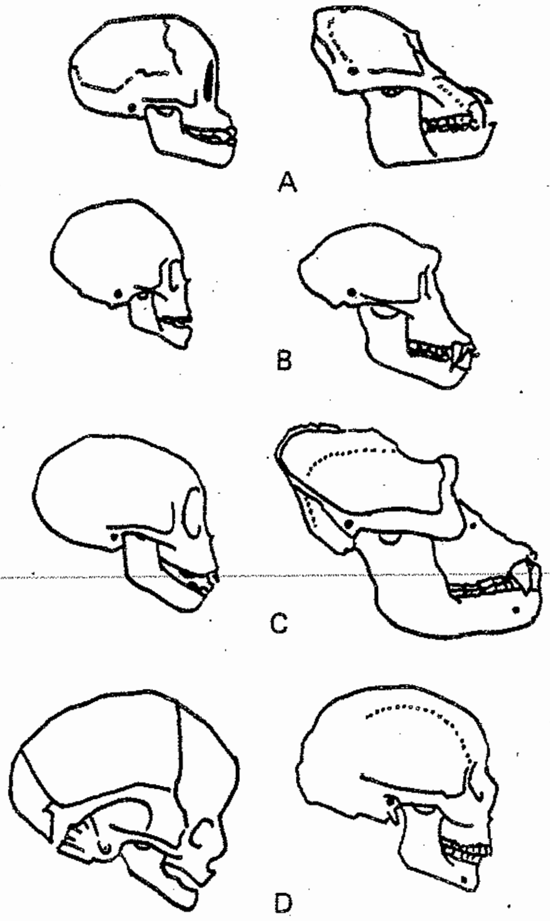


Figure 14. Changes in skull form from newborn to adult: (A) Orangutan; (B) Chimpanzee; (C) Gorilla; (D) Man. (After C. S. Coon, *Origin of Races*, p. 169, Fig. 11.)

the way we smell. These musky perfumes emanate from a milky fluid secreted by certain *apocrine* glands usually associated with the hair follicles; these are quite distinct in form and purpose from the *eccrine* glands that release sweat to help cool our bodies.

Again, the restriction of the smell glands to sexually significant parts of the body is another example of prenatal human conditioning. Other mammals have the organs more liberally distributed over their bodies, and there are signs that we, too, were once

similarly endowed. In its fifth month, the human foetus has rudiments of the apocrine glands discernible over most of its skin, but within a few weeks they disappear again. Clearly our genotype, our genetic constitution, allows for a more extensive furnishing of apocrine glands, but an overriding timing mechanism decrees a re-scheduling in their development and a more selective distribution.

In many other respects man exhibits this wonderful capacity to manipulate the foetal timetable to produce an infant immature enough to develop in ways that are uniquely human. Further examples of infantilism in man include his round-headedness (*brachycephaly*); his small face and large braincase; the thinness of his skull bones and nails; the disposition of his big toes, in line with the others; the preservation of a long thumb; and his prolonged postnatal dependency and extended growth periods. We can afford to be born into the world in a neotenous condition of immaturity because our babies are able to count on many years of tender parental care in comparatively settled circumstances. Despite their extreme vulnerability at birth, human infants will be continually protected while they finish their embryonic development outside the safety of the womb.

Of course, neotenous retardations of maturity to permit subsequent specialized development have to be accompanied by other adaptations to allow for the reception of an immature organism. The human baby's survival depends on a number of preparatory social and domestic factors. The mother must be conditioned to respond to its plaintive cries for attention, and adults of both sexes must react to infantilism in general, to respond to the nurturing instinct evoked by a small body, soft, rounded facial features, and big, appealing eyes. Above all, there has to be a pair bonding between the parents which is characteristically human, and which in turn depends upon the physiological change from oestral receptivity on the part of the female, the periodic 'coming into heat' of most mammals, to the menstrual cycle, and a continual sexual receptiveness.

The mutations that must have occurred in the human genotype to vary the scheduling of foetal growth will primarily have affected the endocrine system, particularly the pituitary gland and its secretion of the growth hormone, *somatotrophin*. That fine balance which is maintained by the body's blood chemistry is sensitive to racial variations, and it is not surprising that the degrees of paedomorphism exhibited by the various subraces of man should differ considerably. For example, Mongoloids are more neotenous than Caucasoids: they have less body hair and head hair follicles, have a larger braincase and brain, are more frequently brachycephalic, or roundheaded, and have a broader face. The Mongoloid eye fold, giving that characteristic 'slant-eyed' look, and their protuberant eyes are infantile features. The same is true of their smoothly rounded forehead, lacking brow ridges; the depressed nasal root; the shallow *mandibular fossa*, or jawbone sockets (Fig. 12); and their generally stocky build with a delicate bone structure.

The Mongoloids, in fact, are among the most paedomorphous of all the races, and so are generally considered, in what would seem at first sight to be a strange contradiction, to be morphologically the most advanced. For in the living world, retardation of foetal development is not synonymous with physical or mental inadequacy; the reverse is often the case. It may well be that this neotenous delay in the appearance of certain 'adult' features has enabled the Mongoloid race to retain its remarkable homogeneity, despite its distribution across half the habitable world.

The Negroes (Congoids) have some paedomorphous features in common with the Mongoloids. They, too, have little body hair, a bulbous forehead, protruding eyeballs, and a depressed nasal root; and they also have an infant's flattish nose and small ears. Their close relations, the Pygmies, add to these features their small stature, which has given them mobility and better temperature control in their humid tropical rain forest homes, and the retention of their foetal body hair.

Bushmen and Hottentots (Capoids) are reckoned to be the most infantile of all the races. Along with their small stature and small hands, feet, and upper arms, they are round-headed. Their eyes are widely separated and covered with their own variety of epicanthic eye fold, similar to the Mongoloid but differently constructed and giving them a slit-eyed look. They exhibit a bulging forehead and relatively large brain; widely spaced skull

walls and cheekbones; a small, orthognathous face with a slender jaw; a wide, squashed-looking nose; pouting lips; small ears; and little body hair. Pygmy men carry their sexual organs horizontally projected like little boys, even when unstimulated to erection, and the scrotum is contracted, giving the impression that only one testicle has descended, and that imperfectly.

The mutational changes, then, that allow an organism to survive new ecological hazards, or to benefit from fresh opportunities, do not necessarily produce a completely new physiological feature or even radically change the existing structure; they may merely change the timetable of the developing embryo. The degree of infantilism in man varies considerably with the races and has given rise to some of their most distinctive characteristics.

Chapter Three

MANNERS MAKETH MAN

Man is born a barbarian, and only raises himself above the beast by culture.

BALTASAR GRACIÁN
The Art of Worldly Wisdom, 1647

The way in which the demands of our cerebral taskmaster have governed man's foetal chronology is a reminder that we are, above all, cultural animals. To an ever-increasing extent we are fashioning our environment and urging our bodies to adapt to it. We are thus beginning to manipulate our own evolution, and not always in our own best interests. We are producing new hazards and at the same time overriding our built-in safeguards. We increase the tempo of our lives and disrupt the smooth rhythm of the body's biological timekeeping, and we then suppress the danger signals with drugs and stimulants. We breed more children than the planet's resources can properly sustain, nurture them to adulthood by our humanitarianism, and then need to devote more and more effort to countering the physical and emotional effects of overcrowding. Similarly, we sustain the congenitally infirm into maturity and old age and thereby defeat the selective mechanism that would otherwise have removed their mutant genes from our breeding populations.

But environmental and cultural pressures are not the same all over the world, and geographically diversified peoples have not reacted to them in the same way, or at the same rate. To understand such culturally directed adaptations, we should glance back at the role of culture generally in the evolution of early man (172;173). Incidentally, it should be emphasized that the term 'culture' in this context implies more than the intellectual pursuits of an educated minority. In the words of a pioneering English anthropologist of the last century, it is "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society" (385). Above all, human culture includes that technical expertise which gave man superiority in the chase over stronger, fleeter, and more acutely sensitive creatures, enabled him to domesticate other animals, to plant and harvest crops, and, more recently, to harness the power of the elements to augment his own limited physical capabilities. Archaeologically, man's early cultural attainments are measured primarily by means of his tools, from the roughly shaped stones left by hominids of 2 million years ago in their African camping sites to the finely flaked implements of the European Stone Age.

Many of the arguments that persist about whether evolutionary developments in man's physiology preceded or followed his acquisition of new skills or eating habits must seem like variants on the old chicken-and-egg riddle. The fact is that in all evolutionary changes there has to be an interplay between cause and effect, between the biological development of the organism and the demands imposed upon it by its ecology. For example, a crucial point in man's evolution was his standing erect on two feet and the consequent freeing of his forelimbs for carrying burdens and manipulating tools and weapons. It cannot be argued that bipedalism arose primarily to exploit his new discovery of tools, since some four-footed animals are known to extend their powers of reach or attack with stones, twigs, and branches, with quite remarkable skill (199;250;256). Our closest relatives, the chimpanzees, have been observed in the wild learning to choose, prepare, and use twigs to probe for termites, and to pass on these accomplishments to youngsters (186;187;188;189). Nevertheless, standing erect must have facilitated the hominid's use of tools and promoted further neurological and physiological refinement, so that he could develop the full potentiality of his manual dexterity.

With forelimbs now freed from the demands of locomotion, the hands could evolve to allow more precise and controlled movements than are available to any other animal. We can see in the womb a recapitulation of a fundamental development in this process. The thumb of the human foetus starts out in line with the fingers but begins very early to rotate until it comes to rest at a ninety-degree angle to the axis of the fingers, enabling the tops of the thumb and forefinger to grip quite small objects. About the same time, the thumb's place of origin, on the same knuckle line as the other digits, moves towards the wrist. Something similar happens with the Old World monkeys and the apes, but in their case the process of rotation and movement wristward begins later, and rotation is less complete. Also, with them, the thumb becomes short, whereas the human thumb remains long, as was observed earlier.

Our earliest hominid ancestors show the same kind of interim development. *Australopithecus* had a thumb less fully rotated and shorter than modern man's, so it would seem unlikely that he could have exercised the same degree of precision needed to produce the finely split artifacts of his Stone Age successors, even if his small brain had been capable of devising such implements (310). Nevertheless, our early ancestor must have had sufficient dexterity in his limited 'power grip' to have fashioned the crudely chipped pebbles found in his campsites (262). At least he would have appreciated the advantages that could be gained by wielding stones for pounding, digging, and scraping. Even a split pebble will provide a sufficient edge for severing flesh and bone, and a mild movement of the fist can become a lethal blow when it bears a rock. More than a million years would pass before a larger-brained hominid appeared on the scene capable of improving substantially upon the crude chopping tools of *Australopithecus*.

Cultural influences on the evolution of the human hand cannot be dissociated from changes in our teeth. Even the earliest apelike hominoids at the close of the Miocene epoch, some 13 million years ago, had remarkably small teeth, particularly the *canines* (167). These are the upper and lower teeth that lie between the *incisors* in front and the *premolars* on either side of the jaw. A major characteristic of mammalian dentition is the differentiation of teeth to serve various functions. The front incisors are cutting or nibbling teeth; the premolars and *molars* are for chewing, or grinding, as their name implies (from the Latin word for 'millstone'); but the pointed and projecting canines, or dogteeth, can be used as a primary means of defence. In the males of all present and fossil apes and monkeys, the long upper canine cuts against the first lower premolar, and the lower canine passes in front of its counterpart in the upper jaw. This forms an efficient fighting mechanism. Male baboons can drive off cheetahs and dogs, and they have even been seen to attack leopards. The females, on the other hand, have small canines, being more concerned with avoiding battle and ushering their young away from danger.

It follows, therefore, that if Miocene hominoids of so long ago had managed to dispense with their fighting 'tusks,' they must have discovered some alternative method of defending themselves, presumably by the use of their forelimbs. Again, the more even arrangement of their teeth meant that the jaws were no longer restricted to the straight up-and-down movement of, for example, the ape. When the ape closes his jaws, the canines interlock, making a rotary, grinding movement of the molars impossible. Such movement is essential for dealing with coarse food like skin, raw meat, tough roots, and the like. So we may deduce that the hominoid's diet had widened to include such delicacies, and with it his range of foraging.

However, the complete reduction of the canines to their present size did not happen quickly (19). Some specimens of *Homo erectus*, man's immediate predecessor of the middle Pleistocene, still show signs of unusually large canines, associated with a definite *diastema*, or gap, between the canine and lateral incisor in the upper jaw. Indeed, we bear the traces of our sabre-toothed ancestors in our own mouths; the newly erupted and unworn canines of our children, particularly in their deciduous, or milk, form, may project quite markedly beyond the level of the adjacent teeth and may be sharply pointed. Furthermore, our permanent canines are provided with unusually long and robust roots, a reminder of their former aggressive function.

Reduction in the canines involves more than the teeth alone. The strength needed to seize, shake, and hurl the enemy aside comes from powerful jaw muscles attached to ridges of bone over the eyes and in the neck area. So relaxation in selection for this form of self-defence can also be detected by the palaeontologist in a shortening of the jaw and a weakening of the bone structure of the face and neck.

Lacking alternative means for gripping and tearing food when the forelimbs may be fully engaged in locomotion or climbing, the arboreal primate has recourse to his front teeth, the incisors. Again, a reduction in these, such as we see in the fossil man-apes, may indicate a move towards releasing the forelimbs for more manipulative purposes.

The molars, or grinding teeth, present a rather different picture of evolutionary development. These structures are specifically devoted to masticating food, and any changes in size or condition of the grinding surface can be related to feeding habits. In the early hominoids, the molars are very large, bigger even than in the modern apes, and often show signs of heavy wear, possibly because the roots dug from the ground by these animals were very abrasive.

The tendency to large molars persists in the evolutionary sequence of the hominids. *Homo erectus* has teeth still massive compared with ours, and in some cases as large as those of his early Pleistocene ancestor *Australopithecus* (399;260), but later cultural advances in food preparation allowed a relaxation of selection for big molars (112). During the Stone Ages, a correlation can be clearly discerned between technical innovations in blade manufacture and stages of dental reduction (113;47;53;54;215). The coming of agriculture, some 10,000 years ago, brought a new balance in diet and relaxed the need for strong chewing jaws and their associated muscles. When, later, the invention of pottery made it possible to boil food to a drinkable consistency, sound teeth were no longer essential to survival (55).

Bringing the picture even more up to date, it has been suggested that the introduction of the table fork has been responsible for the appearance of the 'overbite' in European dental occlusion. Primitive people today bring their front teeth together in an edge-to-edge bite, allowing their incisors to perform more adequately their function of gripping and severing food. Since the Middle Ages, when the table fork was introduced, we have been able to hold the food down and cut it before passing it to our mouths (239;240). As a result, our front teeth have tended to overerupt, the upper incisors overlapping the lower ones (46;55).

The fact is that our teeth are still evolving in response to our

cultural demands, and since these are manifestly not the same all over the world, or in every race, we are continuing to develop differently, at different rates. Relative size and emphasis in dentition is, as we shall see, a particularly interesting mark of racial diversity.

But it is the evolution of our brains that is most indicative of cultural changes. *Australopithecus*, for all his semierect stature, remained with a brain the size of a gorilla's for more than a million years. *Homo erectus*, the next grade in human evolution, doubled his cranial capacity (377;90;53). Various reasons for that remarkable increase have been proposed, but in general we may reasonably suppose that it had to do with more integrated communal relationships. Increasingly, the hominid needed to think, plan, communicate, and to acknowledge and respond to leadership, particularly in the hunting field, where, apparently, he achieved some mastery. The archaeological context in which his fossils have been found, from Java to Europe, points to a growing complexity and efficiency in material culture, including the use of fire for cooking and hardening the tips of his weapons (86).

To be able to concentrate attention on a single skilled task for long periods requires a considerable development of the brain, particularly of the frontal lobes, where not only muscular movements are controlled but also the powers of concentration. Furthermore, apart from wanting to improve his own manipulative abilities with tools and weapons, *Homo erectus* would have realized the need to transmit those skills to others of his kind if a superiority over their competitors were to be maintained. This required some more precise means of communication than could be achieved by simple gestures and imitative responses (198). The discovery of speech marked the next crucial stage in man's evolution (242;40;140;396).

Homo erectus entered upon a world of sound-making quite beyond his quadrupedal cousin, and at a time when his newly found manipulative skills presented him with the possibilities of hunting larger prey and venturing farther afield on its trail. His brain needed now above all to devise and to remember phonetic symbols which, extending to the full his expanding powers of vocalic expression, would give him the means of communication with others of his kind.

However, as every parent knows, the period that follows an infant's discovery of speech can be a trying experience for sensitive nerves. The child has found a new and powerful way of compelling the attention of its elders, who have to learn to distinguish between meaningless prattle, the exercise of a new and pleasurable faculty, and a real intention to express needs or to seek information. It has been suggested that part of our intelligence may have been a by-product of that development of the brain which evolved to discern meaningful signals amid a background of social 'static'; that it increased in size to provide circuits that could discriminate between intelligible conversation and a babble of social 'baby talk' (172).

Through speech, hominid communities achieved greater cohesion. Fire, which was probably invented about the same time, about ½ million years ago, gave their campsites a focus of social intercourse. Around its flickering light, in a zone of warmth and protectiveness, the hunters and their families might find mutual reassurance and a sense of common identity and endeavour, transforming the herd instinct of their animal predecessors into a conscious recognition of their interdependence and superiority over other creatures. Conversation, however limited its early range of expression, enabled them to share their thoughts, relive events of the day, plan their future campaigns in the field, bargain for shares of the spoil and for sexual partners, and, above all, to arrange their thoughts in a logical pattern.

The human mind could now begin its greatest adventure. Gradually it assembled the apparatus by which a higher level of consciousness could sift and analyze the mass of information being fed to the brain by an increasingly receptive sensory system. To this division of the mind man owes his genius for conceptual thought, and through the discipline of the ego over the id came the uniquely human faculty for emotional restraint, social morality, and rational judgement, as well as a chronic susceptibility to mental instability (166).

The hunting and gathering way of life was the physical and spiritual forging ground of our species, and it has left its mark upon every aspect of our minds and bodies. We have been farmers for only 10,000 years, and urban industrialists for but a few centuries, but we were hunters for the greater part of our primate evolution, and it was against this cultural background that we grew to man's estate. Small wonder that our anthropologists are continually discovering aspects of our common genetic heritage that can be directly attributed to the needs of a hunting economy, and which still mark our present social, family, and sexual relationships and inspire many of our deepest religious emotions (397).

However, cultural advances did not occur simultaneously throughout the scattered breeding grounds of our ancestors, any more than are the fruits of modern technology immediately available to all peoples. We should therefore expect to see some disparity in the rate and direction of evolutionary development between those populations who benefited early on from a major cultural advance and those for whom its advantages were delayed. Clearly, if the inhabitants of one region acquired the use of, for example, fire, long before those of another, the profound changes that must follow in the more advanced community's way of life, their better chances of survival in cold weather, their independence of fixed bases, their greater flexibility in diet, and so on, must affect the manner of their evolution. Domestic fire apparently arrived relatively recently on the African scene, some 59,000 years ago to judge from the largely negative evidence of early campsites. This delay in technical progress must aid in explaining the extraordinarily slow pace of human evolution in that continent south of the equator, and possibly also south of the Sahara, during the Middle and Late Pleistocene (58;100:332).

Nowadays, man's future as a species is threatened by a curious combination of excess numbers and a sabotaged self-regulatory system, both the results of his own cultural advance. We shall see in the next chapter how nature has devised means for limiting populations, and how there may be some racial differences in the operation and effectiveness of that control. But in the fields of medicine and social welfare we are helping to frustrate the natural processes of selection and thus are not only contributing to the problems of overpopulation but are also endangering the gene pool of our species, our primary resource, and the result of billions of years of evolution (see Chapter One).

The normal screening processes of natural selection minimize the incidence of mutated genes that would result in serious physical or mental incapacity. The affected individual, even if he survives to adulthood, will probably not be able to procreate offspring to carry the mutant gene to subsequent generations. However, advances in medicine during the past few decades have drastically altered the situation. By ensuring the survival of patients who have inherited genetic defects, and allowing them to mature and pass on their mutant genes by further breeding, we have relaxed the selection against mutations and have added to the species' genetic load.

For example, children who suffer from *phenylketonuria*, a rare but serious inherited condition affecting the brain, can now be identified soon after birth and helped to achieve a nearly normal development. The cause of the disease has been traced to the lack of a specific enzyme which is synthesized in the liver. The fault lies in the mutation of a single gene, and the enzyme deficiency results in the accumulation of the amino acid *phenylalanine*. Suitable diets can be prescribed which limit the intake of this substance, but such treatment, while effective, has in no way 'cured' the defective gene; it has merely circumvented its effects. Untreated phenylketonuric individuals would normally be too mentally retarded to procreate offspring, but they now may well marry and succeed in prolonging the defective strain in subsequent generations.

Similarly, *diabetes*, which is the result of a complex genetic aberration involving more than one gene, can be treated by the injection of insulin from sources external to the body, and the afflicted person can be helped to live a normal life. *Galactosemia*, where the ingestion of milk sugar results in stunted physical and mental growth, can be countered by prescribing a milk-free diet and the use of a synthetic formula containing cane sugar.

Some congenital defects like cleft lip and palate can be corrected by plastic surgery, which, in severe cases, may even save life; it will often hold out to the afflicted the chance of acceptability in society and a fruitful marriage. Doubtless many more such euphenic remedies for genetic defects can be expected from modern medicine, and they will bring relief and the prospects of a fuller life to many sufferers. They are, nevertheless, adding to the genetic load of *Homo sapiens* and making us even more dependent upon cultural resources to maintain the viability of our species (204:918).

Culture, then, has become the prime selective agency in the evolution of *Homo sapiens*. It not only determines the mode and direction of man's development, but it also constructs the ecology for which he is adapted. It follows that, since the cultural levels of the various human populations throughout the world differ so enormously, their evolutionary progress will be similarly diverse in both degree and direction. This is not just a matter of differing levels of intelligence and technical ability but of important physiological adaptations transmitted through the gene pools of whole populations.

Chapter Four

TOGETHERNESS

> Over-population is a phenomenon connected with the survival of the unfit, and it is a mechanism which has created conditions favourable to the survival of the unfit and the elimination of the fit.
>
> WILLIAM RALPH INGE
> *Outspoken Essays,* 1922

Animal species vary greatly in their tolerance to overcrowding. Some insects live and work together in hives or labyrinthine earthmounds in groups of hundreds and thousands; fish swim in schools; and birds fly in large migratory flocks. But primates lack this facility to live in very large groups. The small nocturnal species mostly walk alone, while diurnal animals like the lemurs associate in small groups of little more than a dozen individuals (44). New World monkeys are more gregarious; howler monkeys live in troops of about seventeen (76), but while their Old World cousins, like the Japanese macaque and the open-country baboon, may move together in larger numbers, their basic organization rests on more limited 'families,' consisting of a dominant male with his harem and offspring (279;200). The gibbon's social life is more 'human' in the pairing of a single male and female and in their close relationship with their young, but while they may mix briefly with other such family units, they prefer to keep to their own exclusive feeding areas (75;127;128). The orangutans are less stable in their partnerships but associate only in small groups, rarely exceeding five individuals. Chimpanzees move about in companies of between sixty-five and seventy-five, over an area of between six and eight miles (315;188;189). They may come upon other such groups during the course of their foraging but then go their respective ways without conflict or deeper involvement. Similarly, the amiable gorilla rambles contentedly about his forest domain without territorial ambitions. The small gorilla units consist of a dominant, but easygoing, silverback shepherding his consorts and young around their ten to fifteen square miles of familiar ground, accompanied by junior males who are allowed to share the sexual favours of the females when they wish (323;148;344; 345;126;128;331).

We may reasonably suppose that our primate ancestors lived in similarly limited family groups. But once the hominoids had left the security of the forests and taken to the savannahs, they would have needed to remain in close proximity with others of their kind for mutual protection and more efficient hunting techniques. We should then have a gibbon-type family unit emerging, but lacking the fierce exclusivity of that primate's sexual relationship (74;96:21). Such an arrangement could offer the advantages of a closely knit domestic group, but for it to succeed for any length of time would have required significant genetic adaptations to temper the natural antagonism between competing males living in the same hunting pack.

In an oestral situation, such as we find among the chimpanzees, the female comes into heat periodically and at such times is the focus of general sexual attention (410;411;412). Jane Goodall reports seeing seven male chimps, including an adolescent, copulate in succession with one female with no apparent show of aggressiveness towards one another (189). But in a gibbon-type sexual relationship, and even more in a non-oestral hominid situation where the female is continually receptive to male advances, such tolerance could not be permitted; it would threaten the pair bonding on which the necessarily prolonged care and guidance of the young depended. Therefore, our ancestors must have somehow adapted physiologically towards living in closely knit groups of several families, while at the same time restraining their natural suspicion of potential competitors. This meant developing more efficient ways of expressing mutual recognition and clarifying non-hostile intentions. Such adaptations would have required changes in the hominid's nervous and endocrine systems, as well as an expansion of the associative areas of the brain.

Once our forebears had learned to live with their immediate neighbours, they could embark upon a richly rewarding era of collaboration in achieving their domination of the rest of the natural world. But for all their growing interdependence, it would be hundreds of thousands of years before hominid communities began to feel constrained by the pressures of overcrowding. Local populations of *Australopithecus* could not have been large. Seasonal dearths would have restricted their numbers in any one area, and every year when the hot African sun turned their grasslands into deserts, they would have needed to disperse in smaller groups to scratch out a bare subsistence around perennial waterholes. A more evolved physiology, a better brain, and an advanced culture enabled their successors, *Homo erectus*, to venture to the extremes of the habitable world, from the Far East to the Atlantic; overcrowding in one locality could be relieved by migration to another.

However, when, some 10,000 years ago, man began to cultivate plantations and herd domestic cattle, he was ensuring not only constant food supplies for himself but almost insurmountable population problems for his descendants. The more successful his agricultural skills, the greater the numbers he attracted into his settlements, and the more closely packed the inhabitants, the more subject they became to the ills attendant upon overcrowding. Furthermore, in the short time that has elapsed since that cultural revolution, man's technical prowess has not only given him superiority over most of his natural enemies, but it is helping him frustrate those built-in safeguards which would otherwise limit his numbers to the resources of the ecological support system.

Animals generally manage to maintain relatively constant numbers in any given area. There are bound to be fluctuations from year to year with changes in the climate, numbers of predators, and so on, but such variations are usually transitory and, over long periods, are of little significance for the maintenance of the population.

Three main theories have been advanced to account for this relative constancy. First, periodic natural catastrophes decimate populations and prevent them exceeding their optimum limits. Second, organisms have evolved a kind of code, expressed through behaviour displays, that convey to other individuals the state of the population and its need for further supplementation or depletion. Such signals have the effect of evoking an appropriate response with regard to inhibiting or stimulating mating. Third, the rate of a species' reproduction is in some way controlled by a self-regulatory mechanism: the larger the population at any one time, the fewer young are born or survive to maturity (204).

This last explanation for population control in nature has attracted much attention of late, not least in its possible application to the human situation. Experiments on rodents and other animals forced to live in an intolerably crowded situation have shown that they experience a stimulation of that part of the brain known as the *hypothalamus* and a consequent response in the anterior lobe of the pituitary, the 'master' gland. This in turn reduces the secretion of the growth hormone and of the substances that stimulate the sex glands to function. At the same time, the pituitary overstimulates the adrenal cortex. The end result of this neuroendocrine chain of events is to stunt the animal's growth, reduce its fertility and its lactation, alter the sex ratio at birth, increase susceptibility to disease, and raise the population's mortality rate. The immediate cause of death in the individual is usually to be found in a rise in the cholesterol level accompanied by atherosclerosis, a fatty degeneration of the arteries and a forerunner of arteriosclerosis, when the artery walls become hardened (83;84).

Even zoo animals that have not been subjected to overcrowding and have been given a high protein diet often show the same symptoms. Confined in their cages, they can see other animals through the bars, apparently threatening their territorial rights, but are forcibly restrained from taking the kind of counteraction for which they are genetically programmed, either attacking and driving away the intruders or retreating to some unoccupied area. The resulting frustration produces a malfunctioning of the endocrine system and a high level of cholesterol in the blood, leading to an early death (329).

Stress of a similar kind, quite as much as is caused by too many eggs or too much fatty meat, probably accounts for much of the heart disease afflicting urban civilizations today. But it seems possible that nature can provide *Homo sapiens* with some defence against this self-imposed harassment. Experiments with fruit flies have shown that a faculty for withstanding pressures from high density living can be bred into organisms. The numbers able to live together in the same space and with the same amount of food was trebled in three generations (78).

There is evidence that some human beings are also able to tolerate crowded conditions better than others, and that this facility can be inherited (100:110). This might account for some of the extraordinary ability on the part of some races to survive the kind of overcrowded living conditions in their urban communities that others of us would find intolerable. Admittedly, there will be a strong element of cultural conditioning in this. Nevertheless, evidence does seem to point at least to the possibility that there is some genetic factor involved. If, indeed, some races do possess an adaptive trait that permits them to survive such extreme 'togetherness,' it might suggest future trends in population statistics, showing where expansion might be genetically acceptable and where further reduction, through cultural self-limitation, or through stress acting upon the body's biochemistry, is to be expected. If sheer weight of numbers were to become the determining factor in global power politics, then one would have to acknowledge that the future lies with those races capable of tolerating the largest urban populations.

There are, of course, other ways than endocrine imbalance by which overcrowding can affect individuals and bring about a temporary reduction in numbers. Insanitary conditions in more primitive communities, or on the outskirts of 'advanced' urban centres, encourage disease vectors like mice, rats, cockroaches, and other vermin, due largely to inefficient or nonexistent sewage disposal. Monkeys and larger apes drop their dung where they squat and move on; fouled nests are abandoned and fresh ones constructed the following night (185). Nomadic and peregrinating peoples like the South African Bushmen keep a move ahead of the parasitical disease vectors that breed in the rubbish they leave behind, and where travellers are few in number, the dung-burying beetle has little difficulty in disposing of their faeces (208). But among the more sedentary populations, reinfection from natural waste has made intestinal parasites an important source of sickness and early death (172;173), and the dysentery they cause is often aggravated by protein malnutrition from a one-cereal diet (351;352).

In some areas, man has adapted serologically to counter diseases that his own cultural activities have induced, and these changes in blood chemistry have provided the anthropologist and geneticist with interesting population tracers. For example, in central Africa, the introduction of agriculture to rain forest areas has meant that, in clearing the ground for planting, Negro farmers have left open spaces where stagnant pools collect and prove ideal breeding grounds for various species of the malarial mosquito, *Anopheles*. At the same time, the larger communities now permitted by more regular food supplies have offered reservoirs of infection for the crippling disease (267).

Nature's response to this critical situation has been to capitalize on a genetic mutation that affects the oxygen-carrying haemoglobin corpuscles in the red blood cells. These corpuscles distort the red blood cells from their usual disc shape to the form of a crescent, or sickle, and such 'sickle cells' may clog blood vessels and thus prevent the effective distribution of vital oxygen to the tissues. In severe cases, usually in children whose parents are both 'sicklers' (that is, homozygous situations), the victim will not normally survive to adulthood; those who do live will suffer from chronic anaemia. However, in the more common heterozygous situations, where only one of the parents is a sickler, the child will show no symptoms of anaemia in normal atmospheric conditions but will have the great advantage in an infested area of a large degree of immunity from malaria, particularly during the critical years of childhood before his body has acquired other means of protection against the parasite. In some places, 'sickling' may offer a child a 25 percent better chance of survival (190;9;232;233;234;264;302; 172;363).

The individuals thus protected against malaria have, in fact, purchased their virtual immunity at the cost of some freedom of movement, since the mutated haemoglobin can produce fatal anaemia in circumstances of reduced oxygen supply (172). This means that 'sicklers' cannot live at high altitudes and should avoid flying in unpressurized aircraft (238). But since malaria rarely extends to regions of over 6,000 feet in altitude, or above the winter frost line, this sacrifice has not been of great significance. Where populations with inherited 'sickled' blood cells have gone to live in higher regions, such as the highlands of East Africa, the processes of natural selection have weeded out the sicklers and encouraged the breeding of normal (nonmutant) blood-celled people, who have nothing to fear from the threat of malaria in their adopted homelands (206).

By tracing the incidence of the sickling trait in Negro populations throughout the world, it has been possible for observers to follow the movements of the mutants and to estimate the generations that have passed since their progenitors needed protection from the malarial mosquito. This is not specifically a racial characteristic, since sickling is not confined to the Congoid subspecies, but it is an interesting example of a heritable adaptation affecting a particular population threatened by a culturally induced environmental hazard.

Togetherness, then, gave man his supremacy; now it threatens his survival. It may be possible, as we have seen, to adapt biochemically to tolerate overcrowding, and those races that have managed to do so stand a better chance of securing control over the more productive areas of the globe, and of thus gaining for themselves a little more time. But whether that kind of existence can be called living in any civilized sense, is another matter, and *Homo sapiens* has still to decide whether biological existence can be equated in a cultural society with meaningful life.

Chapter Five

THE MAKING OF A RACE

This fortress, built by Nature for herself,
Against infection and the hand of war;
This happy breed of men, this little world...

WILLIAM SHAKESPEARE
Richard II, II,1,43–5

A race must have a home. Every subspecies of *Homo sapiens* originally occupied a large, geographically unified area and was in limited contact at the margins with other ethnic territories. Within such a region, each race acquired its own distinctive genotype through the selective pressures of its environment and, as we have seen, through the direction of its culture. However, not all racial characteristics are adaptive, the result of exigencies of ecology and social economy; some have arisen through chance mutations being perpetuated in a limited breeding population.

Normally, as we saw in Chapter One, a neutral mutation, that is, one that offers the organism no particular advantage or disadvantage, will not spread very far. It may persist through several generations within the mutated individual's own social circle for want of some selective force acting against it, and then die out. But where the whole breeding isolate is small, the mutation can spread through the entire group if chance removes the nonmutated fertile members, leaving only those carrying the gene to maintain the population. Geneticists call this phenomenon *genetic drift,* and it may well have played a large part in establishing nonadaptive racial characteristics (408;409;183;135).

It has to be remembered that at the time when hominid and human races were being formed, the numbers in breeding populations would have been very small. It has been estimated, for example, that the total population of Ice Age Britain during the Upper Palaeolithic (Late Stone Age) would have been between 250 and 2,000 persons, and probably nearer the lower figure during the winter months. Prior to that, in the Lower Palaeolithic, there were probably no more than a dozen hunting groups in Britain. Even today, in those few areas of the world where hunting is still the chief means of subsistence, social communities are necessarily limited. Among Australian aborigines, for instance, tribes numbering more than 500 individuals are a rarity, and members tend to marry within their own groups (294:398f.). In such limited numbers, a distinguishing trait has a good chance of being transmitted through the whole community, and it then enters the genotype of any race that evolves out of that breeding isolate. This accounts for some of the features that distinguish human populations and which seem to offer no particular advantage to the individuals concerned.

The characteristic traits of a community, however they may have arisen, form the 'trademark' of that group by which its members recognize and accept one another within their own territory. They can expand to its limits and resist the incursion of intruders and potential competitors, maintaining their genetic identity and restricting gene flow across their borders. The result is the accentuation of racial distinctions. If the population were to become completely isolated over thousands of generations, the racial genotype would become so different from that of others of their kind that the race would become a new species and individuals would be genetically incapable of interbreeding with their neighbours and producing fertile offspring. But among humans there has been neither the time nor the opportunity for such isolation and speciation; however difficult the geographical, climatic, or cultural barriers, there has always been opportunity for some gene flow to maintain the unity of the taxon.

The human species has thus managed to maintain a healthy diversity in racial genotypes, giving man the ability to adapt to a wide range of ecological situations and a biological unity that has allowed an extraordinarily extensive distribution without taxonomic fragmentation. As we shall see in our discussion on racial mixing (Chapter Ten), any dilution of genotypal variance could result in the kind of overspecialization that has brought about the extinction of other species. With the standardization of so many aspects of our lives, through the global propagation of common cultural ideals, it seems even more important to maintain racial identities and as large and diverse a gene pool as possible.

When certain characteristics of a race are described as 'typical,' they are those that have seemed to trained observers to differentiate one ethnic taxon from another. A typical representative of that race will be a person who exhibits so many of those traits, or so many that are particularly significant, as to make it impossible to classify him in any other category. Clearly, in such a widely proliferating species as *Homo sapiens,* there are bound to be many intermediate groups whose identification in racial terms presents extraordinary difficulty. Technological advances have increasingly rendered geographical and environmental frontiers inoperative as genetic barriers. Nevertheless, there are sufficient ethnic differences remaining between regionally separated groups to warrant the preservation of the concept of race. Externally, human beings vary more from place to place, and from race to race, than any other mammalian species, except those whose differences have been genetically engineered by man for his own purposes, like the dog.

The Chinese and Japanese, for all their subracial differences, are at once recognizable as two members of one ethnic taxon, the *Mongoloid,* and they may be clearly distinguished from the full-sized, black-skinned Negroes of central Africa, the *Congoids.* The Australian aborigines are different from every other race and form their own subspecific taxon, *Australoid,* as do the fast-disappearing Bushmen from southern Africa, the *Capoids.* With the *Caucasoids,* these races comprise the five major subspecific taxa of mankind, and each can be further divided into subraces or affiliated with various intermediate, so-called *clinal,* populations. A cline is a gradual progression in the aspect of an anatomical feature from one geographical region to another.

So blurred have some racial boundaries become through marginal gene flow and migration that some observers feel that the whole idea of subspecific division of the one human species should be abandoned (268;51;52;295;296;210;143;25). Much of this tendency is prompted by the often cruel misuse of racial concepts for political ends, but such unscientific aberrations should not be allowed to detract from the realities of racial differences, even though it should make us wary of drawing too precisely the geographical and morphological divisions between the various subspecies (401:86).

It can be argued that many of the most conspicuous marks of a person's race are comparatively insignificant, like adaptations to suit particular environments, including hair, eye, or skin colour, nose shape, degree of body fat, and the like. On the other hand, even the most superficial variations can sometimes involve quite complicated polygenetic changes, taking hundreds, or even thousands, of generations to become established (330), and must therefore be considered indicative of long-term regional segregation. Furthermore, those heritable traits which involve the body's biochemical constitution may have far greater consequences for human relationships in a multiracial society than mere differences in colour or stature. The size, form, and histological structure of the endocrine glands, particularly the pituitary, thyroid, parathyroid, and adrenal glands, can fundamentally affect individual temperament and behaviour, and these structures have been shown to be racially variable (367;368;164;319;372;80;201;202).

There is no doubt that lower animals are temperamentally different from one another, as any dog lover will testify, and that temperament can be bred into a creature. Among smaller mammals it has been shown that genes that affect body weight and the size of various organs can also affect tameness and docility (70). Human aggressiveness is affected by hormonal influences on the brain early in its formative stages. To be exact, it is not aggressiveness itself that is imparted by hormonal secretion but the development of the brain's sensitivity to certain stimuli, so that they excite a greater response in an individual at a later stage in his life. That is, we are not necessarily born aggressive by nature, but some of us are more genetically conditioned to react violently to fear and attack than others. Such responses have an important part to play in evolution for the survival of the fittest, or the 'quickest on the draw' (201;202;82;163).

Mental abnormalities and abilities are similarly heritable, as a comparison of the incidence of schizophrenia in related individuals has shown (236;237) and as the results of intelligence tests

indicate when applied to children sharing a common environment but of differing degrees of affinity—the closer their family relationships, the more similar is their level of attainment (404;142).

Behaviourists would claim that many other aspects of human relationships are genetically conditioned, and there seems no reason to doubt that people are as different in the development of their nervous and sensory systems, including their mental abilities, as in other aspects of their physiology (307;153;162). Whether such biopsychological differences can ever be racially attributed on a scientific basis remains to be discovered, but it is certain that such studies, which must include comparisons of intellectual ability, are unlikely to be pursued rationally in the near-hysteria that seems at present to attend all racial questions.

There are, of course, particular difficulties in measuring and comparing cognitive abilities among racial groups, and any results that are obtained are immediately subject to attack either as taking insufficient account of environmental factors affecting individual performances or for not allowing for genetic dilution in the family background of those examined (342;343). North America is, perhaps, the one part of the world where the major races are represented in sufficient numbers to offer meaningful results, and where it is possible to select from each ethnic group samples for testing that are of an equivalent social class, formal education, and home background. Nevertheless, there seems no end to the objections that can be raised to the validity of such tests and the results thus obtained, however they are presented or qualified (56;150).

At heart, one suspects, there lies the fear, almost paranoia, of seeming to make comparisons between races that reflect upon their valuation as human beings; that to be better equipped for making cognitive assessments is to be morally 'superior.' This attitude stems largely from a peculiarly Western regard for professional advancement and for the fruits of success in a materialist society. Since most of the Intelligence Quotient (IQ) testing was first devised in the Western world (20:438f.), it is not surprising that schemes and marking tend to be primarily directed towards standards demanded in a European cultural situation. A great deal of ingenuity has been exercized in adapting those early tests to suit people of different races, with different customs and aspirations, but it is difficult for a Western investigator to free his mind completely from his preconceptions about the nature and importance of logical association.

Perhaps the most significant investigations have been carried out among racial groups living within their own home environment and reacting to mental stimuli to which they are accustomed in their normal domestic situation. The results thus obtained have much intrinsic value but are not properly comparable with data obtained from other racial groups, since there is no universally accepted calibration for the measure of cognitive ability. As so often with race studies, it is perhaps better to observe and to record, and then simply to assess the differences of attainment within locally accepted criteria of proficiency, without attempting to make value judgements on the basis of comparisons with other peoples living different lives in different places. The way may then be open for the geneticist and the biopsychologist to discover the relationship, if any, between racial attitudes and genotype, without incurring the righteous wrath of race-sensitive anthropologists, social workers, and politicians (56;245).

For example, although it is of interest, and perhaps of importance, that IQ tests applied to Mongoloid (Chinese and Japanese) children resident in North America demonstrate cognitive abilities as high or higher than those possessed by equivalent groups of Caucasoids (20:490f.), it would be even more interesting to know whether there is some racial predisposition in the application of that native wit that has historically produced such different civilizations in their respective homelands. Is there some fundamental difference in the Mongoloid and Caucasoid genotypes that has been responsible for the conception of such disparate traditions in art, language, and philosophy? The question is not wholly academic. A deeper understanding of the possible relationship between traditional values and, for example, racial differences in body chemistry, would serve us well in the conduct of international diplomacy and, nearer home, might save us from unwittingly provoking antagonism between ethnic groups in our mixed societies.

We may now proceed to examine in more detail some of the distinguishing marks of the five major races of our species—Caucasoid, Mongoloid, Australoid, Congoid, and Capoid.

Chapter Six

CAUCASOIDS IN COMPARISON

> O, who can hold a fire in his hand
>   By thinking on the frosty Caucasus?
>
> William Shakespeare
> *Richard II*, I,3,294

The race, or subspecies, of *Homo sapiens* to which most of the world's population belongs (about 55%) is variously called *Caucasoid* ('having the form of one from the Caucasus') (38) and *Europid* ('of the family of the European') (144;321). The former name, adopted in this book, has the advantage of long familiarity, even if scientifically it has little to commend it (332). Few would support its originator's contention that all mankind derived from a 'prime species' (*varietas prima*) living in the Caucasus mountains. Blumenbach, at the end of the eighteenth century, thought that this area was the home of the most beautiful human beings. All other races graduated outwards to the extreme poles of dissimilarity, represented by the Mongoloids on the one hand and the Negroid peoples (Congoids) on the other. It seemed to him that the pale skin of the Caucasians proved their racial primacy, since it could readily become brown, while the reverse was not possible. The other commonly used name, Europid, might be thought to imply a more restricted geographical connotation than is justified, for Caucasoids have their homelands not only in Europe but over large areas of Asia and Africa.

As we have said earlier, 'typical' characteristics of a race are those which have seemed to trained observers to differentiate one ethnic taxon from another. It is important to emphasize that possession of any one of these features does not of itself warrant its owner's inclusion in a particular group. A typical representative of the taxon should display a higher proportion of the primary traits than members of other races so that, taken overall, the taxonomist has no alternative but to place him in that category. Again, the typical characteristics specified for a particular taxon have to be understood in a comparative sense; they are remarkable when compared with the corresponding parts in other taxa. For example, the groove in the temporal bone that carries the chewing hinge of the lower jaw, or mandible, the so-called *mandibular fossa*, is characteristically deep in the Caucasoid skull (see Fig. 12). Of course, this fossa is found in all human skulls, and indeed its particular form is a hominid characteristic, possessed even by *Australopithecus*, who apparently chewed his food with a rotary movement of the lower jaw like primitive men (100:266). But the groove is shallower in other ethnic taxa of *Homo sapiens* and so merits attention in the typical Caucasoid cranium (20:207).

With this proviso in mind, we can now go on to enumerate some features that have been singled out as characteristic of the Caucasoid race, and then to examine those traits typical of certain Caucasoid subraces. Again, as has been pointed out at the beginning of our study, we are primarily interested in fundamental characteristics of the major races, that is, those that seem to have a long history in the development of the subspecies; we are less interested for the moment in those that reflect some fairly straightforward adaptation to environment, like skin colour. Although these are features most commonly associated by the casual observer with racial distinctions, they are less interesting phylogenetically, that is, for tracing the origins and affiliations of subspecific taxa. Of more significance usually are details only apparent by a careful study of the skeleton, since such hard and durable structures can be compared with fossil remains. Where possible, the physical anthropologist tries to relate modern racial characteristics with much earlier developments, and even to trace the lineage of distinctive traits to regional populations of prehuman hominids.

Such detailed studies require the most careful measurements of modern and fossil material, supplemented with informed speculation on the physiological features of extinct creatures, reconstructed from the fragments available. Many of these highly specialized observations lie outside the scope of this more general work, and interested readers are referred to the relevant literature, some small part of which is cited in the Bibliography.

Of the primary features of the Caucasoid subspecies, those affecting the skull are perhaps the most noticeable. The brain case is large and smoothly rounded on top and at the sides. Looked at from above, it is 'ovoid,' or egg shaped, although the narrower end is more blunted by the frontal bone than would be expected from an ordinary hen's egg. The forehead is neither bulbous nor particularly receding, and the brow ridges, so characteristic of the hominids and modern Australian aborigines, are insignificant. (Although in this chapter we are dealing primarily with the Caucasoid race, reference will constantly be made to other populations, and particularly to the Australoids whose chief living representatives, the Australian aborigines, stand in many respects at the other end of the evolutionary scale from Caucasoids and Mongoloids. Their 'primitive' morphology serves as a useful model of comparison and contrast in describing the more 'advanced' features of these two taxa.)

The Caucasoid *mastoid processes*, those 'nipple-shaped' (Greek *mastos*, 'breast') protuberances on the temporal bone behind the ears, are large in contrast to the small processes on the Australoid skull, said by some to be a 'primitive' trait, since they are lacking altogether in most apes (20:281). Relative to the large brain case, the facial skeleton seems small in the Caucasoid; however, in proportion to its breadth, it is in fact quite long. The *zygomatic*, or cheek bones, whose prominence is so marked a feature of the Mongoloids, are relatively small in the Caucasoid face; viewed from above, their arches are barely visible.

The eye cavities, *orbits*, are sharply demarcated at the outer edges and do not curve away into the cheekbones. This has to be considered an 'advanced' feature, contrasting with the orbital margins of *Australopithecus* skulls, with those of apes, and, again, with those of modern Australoids. An even finer point of detail is that within the orbital cavities, the *lacrimal* bone, whose vertical front edge is grooved to carry the tear sac (*saccus lacrimalis*), has a long suture, or joint, with the inner wall of the orbit. This may not have the slightest effect on the Caucasoid's ability to shed tears, but it is again in contrast with the short suture found in the Australoid skull, at times being even reduced to a single point of contact, as it is in the ape (Fig. 15) (381).

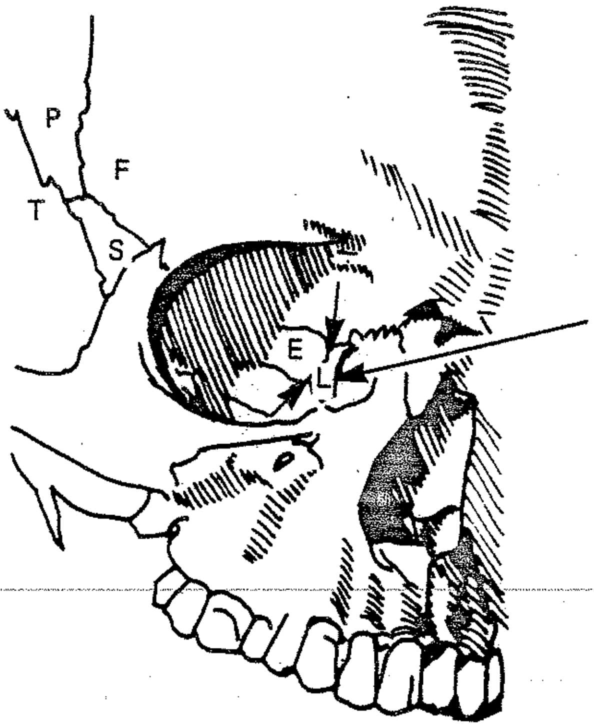


Figure 15. An Australoid skull: P = pterion; T = temporal; S = sphenoid; E = ethmoid; L = lacrimal; the short arrows indicate the ends of the ethmolacrimal suture; the long arrow points to the edge of the posterior lacrimal crest. (After photograph in Baker, *Races*, 1970, p. 287, Fig. 48A.)

The typical Caucasoid nasal aperture, the so-called *apertura pyriformis* ('pear-shaped opening'), is fairly narrow and is shaped like an ace of hearts turned upside down. The nasal bones are long and wide, but narrower above, near the *nasion*, or root of the nose, than below. They spread out from one another in an inverted 'V' form, in marked contrast to the Australoid's shorter, hourglass-shaped nasal bones. More apparent in the living Caucasoid physiognomy, the skeleton nasal structure is straight, markedly different from the Australoid's 'saddlelike' depression at the root of his very wide nose.

Caucasoid dentition is, in general, of moderate size; the incisors project forward very little, and the upper incisors overlap the

lower in the 'overbite' previously mentioned. The upper lateral incisor is usually much smaller than the upper medial incisor, a variation less apparent in other races.

Actually, the size of teeth is not of first importance in determining evolutionary grades, or in comparing degrees of development within a single grade, because so much depends upon the kinds of food available to the creature being studied. More interesting phylogenetically are variations in the proportion between back and front dentition, and in the form of particular teeth and their roots, accretions on the enamel, cusps on the crown, surface wrinkling, and the like. Such details, often quite minute and transitory, can often serve as tracers for racial affiliation and origin (124;209; 258;100:351). For example, *Australopithecus* showed a greater disproportion between the size of his huge cheek teeth (molars and premolars) and that of his front teeth than did any subsequent hominid or man (334). In contrast, living Mongoloids emphasize the front teeth (incisors and canines), particularly noticeable in the 'buckteeth' of the Japanese subrace. On the other hand, the Mongoloid molars and premolars are reduced in comparison, occasionally even lacking the third molar altogether. Australoid teeth are massive fore and aft (72).

As with size, so the forms of Caucasoid teeth are generally unremarkable, in contrast with the more complicated and distinctive Mongoloid dentition. Many of these features appear to have a very long racial tradition, reaching back to pre-*sapiens* populations. One curious feature of Caucasoid dentition, however, is the occurrence of a small conical projection on the enamel of the lingual, or tongue, side of the permanent upper first molar, and occasionally on the second or third permanent molars, called 'Carabelli's cusp' after its discoverer (20:200,208). This phenomenon appears sporadically in other races, but among Europeans it can have a frequency as high as 40 percent. It may originally have had some preservatory function, offering extra protection against wear.

The Caucasoid shoulder blade, or *scapula*, is rather narrow in proportion to its length. The shoulders are wide, and the typical Caucasoid is rather tall. His lower arm is short in relation to the upper arm, and the ratio of arm to leg length is fairly high. His calves are prominent and reach below the middle of the lower leg. The buttocks of the female are prominent but not excessively so, to the extent displayed by the women of certain other races.

The Caucasoid spine is strongly curved. The spinal column is, of course, made up of a number of vertebrae, each of which has a main body, or *centrum,* consisting of a thick disc of bone with two nearly flat surfaces. In hominoids, these are seldom quite parallel to each other, being thicker either at the back, or *dorsal,* side, or at the front, or *ventral* (belly), side. Clearly, if a succession of adjoining vertebrae are thicker on the ventral side, the spine will normally tend to curve the other way, giving a hollowed-back effect. On the other hand, if the discs are thicker on the dorsal side, the spine will curve to give a bowed, or humped-back, appearance. The usual aspect of the spine in bipedal man is a combination of two main curves, to form a narrow 'S' shape.

In fact, the actual configuration of the spine does not depend wholly on the parallelism, or lack of it, between the flat surfaces of the vertebral *centra.* Between adjacent vertebrae there are discs of fibrocartilage which provide a cushioning within the articulated structure. These are the discs that can become deformed and extruded to give so-called 'slipped disc' sufferers so much discomfort. Normally the semifluid interior of these spinal 'shock absorbers' reacts to pressure, and by their resilience the discs protect from jarring our ridiculously oriented and overstressed vertebral columns. Despite their semirigidity, these intervertebral discs are sufficiently shaped and resistant to be able to counteract the natural incline of the surfaces of the bony centra. They may even reverse the curvature that would otherwise have been produced (108;109).

Over a long evolutionary period, the discs performed the function of helping the hominoid spine to accommodate itself to an increasingly upright posture. When, in a manner of speaking, nature decided somewhat reluctantly that this ungainly biped had really come to stay, the centra themselves began to adapt to produce a ventral convexity in the lumbar region and had no longer to rely upon the wedge-shaped intervertebral discs to compensate for the extra thickness of the centra on the dorsal side. Interestingly, we can see this evolutionary process in action within the human species today. The Australoids still have the 'primitive' formation of dorsally thickened centra counteracted by wedge-shaped intervertebral discs (Fig. 16C), while the more 'advanced' Caucasoids achieve their ventral convexity in the lumbar region with 'custom-shaped' vertebrae, evolved to accord with the required curvature (382;383;108;20:208,290).

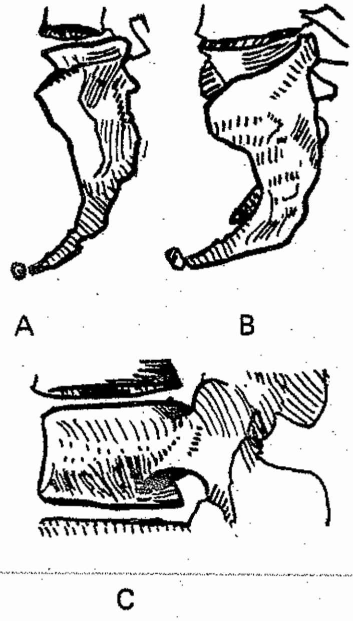


Figure 16. A and B. The sacrum of an Australoid and of a Caucasoid, respectively. C. The third lumbar vertebra of an Australoid, viewed from the left side. (After photographs in Baker, *Races,* 1970, p. 287, Fig. 48 B, C, and D.)

A similar development is noticed in the *sacrum,* that large, concave, triangular-shaped bone at the base of the spine that forms part of the pelvic girdle. The Australoid form stands between the ape stage and the Caucasoid, being ventrally more concave, or cup shaped, than the pongid sacrum, but less so than the Caucasoid (317;383).

The human sacrum is generally broader in proportion to its length than in other mammals, in order to impart greater strength to the lower part of the spine. In females, the sacrum has to be broader than in males, but in the Caucasoid skeleton, the male also has a wider sacrum than his counterpart among the Australoids (Fig. 16A, B).

Caucasoids are said to be among the smelliest of the human races; the Congoids, especially Negroes, have a similar reputation. They are equally intolerant of each other's body odours, and it is interesting that the Masai of East Africa, who have Caucasoid genes in their genotype through their Ethiopian affiliation, find the coastal natives 'odious' in this literal sense (12). A similar aversion is felt by Mongoloids for both Caucasoids and Congoids; the smell of a Negro is said to be particularly repulsive to a Japanese (2). Members of this subrace of Mongoloids have very little *axillary*, or armpit, smell and are not unnaturally sensitive to its presence in others. They regard such odour among their own people as a disease that demands hospital treatment (218).

We have earlier remarked on the mammalian facility for indicating extremes of emotion, of fear and sexual excitement, by body odours. The smells originate from a milky fluid secreted by certain *apocrine*, or *a*-glands (347), usually associated with hair follicles. These glands are quite distinct from the *eccrine*, or *e*-glands, whose sweat helps control body temperature. We saw how the human foetus at one stage of its development has the rudiments of *a*-glands discernible over almost the entire body, but that they disappear after only a few weeks. Where they do persist to birth, they are both more numerous and better developed than in other primates. If, as is usually assumed, the apocrine glands are the more primitive of the sweat organs, it suggests that man must have found good reasons for maintaining their existence over a long span of evolutionary development.

Certainly, part of the answer must be the role played by smell in sexual attraction and stimulation. Where it is the female that produces the odour, as is the case in other organisms, the purpose is usually to steer the male towards his mate rather than to trigger his sexual reflexes. Some female moths are said to be able to make known their presence in this way over a mile or more (159). Where males are responsible for evoking an olfactory response, the purpose is usually stimulatory, but it is also discriminatory, for such odours have an isolating function also, in that they appeal only to females of the correct species. They will attract the right kind of mates even when several closely related species occupy similar ecological niches in the same districts (300).

The sexual significance of the body odours in humans is clearly indicated by the areas of *a*-gland distribution, in the axillary and genitoanal regions, both well endowed with hair for disseminating the scents from puberty onwards. (147) Furthermore, both sites are in well-protected positions, so that the vapourising of the secretions can to some extent be controlled during sexual encounters, by lifting the upper arms, or exposing the genitals. The axillary location is doubtless connected with the proximity of the scent-receptive organs of the upright-postured hominid (347).

However, the races differ considerably in the distribution and number of *a*-glands on the body. They are very weakly developed in the Mongoloids generally, and of the Mongoloid subraces, the Koreans have the fewest; half the population are apparently without *a*-glands at all (2). Japanese women rarely have them in the *mons pubis* area, or on the *labia majora*, while Caucasoid women are well endowed in both places. The males also are well supplied with *a*-glands, around the scrotum and at the root of the penis, particularly (248). They have also been noted around the anus (181), in the skin of the nipples and surrounding areas (248), as well as, in a highly modified form, in the eyelids (286).

There is, as we all know, a less alluring aspect of body odour, and this is probably due to the action of bacteria feeding upon the fatty excretion itself (322;290). Careful attention to body hygiene removes this unwelcome accompaniment of sexual excitement, leaving the precious fragrance that has so far eluded chemical identification. For only minute quantities are secreted by the *a*-glands, and these have proved difficult to collect and analyze. (356) It is worth remembering that, despite the undoubted reduction in man's olfactory capabilities, he is still able to detect the presence of one ten-millionth of a gram of certain substances, well beyond the sensitivity of our most sophisticated detection devices (11).

Bearing in mind that frequent washing is a comparatively modern pastime, it is possible that both kinds of smell associated with the *a*-glands have long had their place in our biological conditioning. We are stimulated by the one and repelled by the other; only if the attraction of our partner is sufficiently strong to overcome the deterrent effect of the foetid constituent will we persevere in our sexual activity and respond to its stimulation. In this way, the secreted substance acts both as a discriminatory and a stimulatory agent, as the male moth's perfume will attract only females of its own species.

It would seem, therefore, that the differences between the races in respect to the distribution and number of apocrine glands on the body, and our marked variation in response to body smells of other taxa, have a long-standing isolatory function. From a very early period, differing body odours would appear to have played an important part in maintaining genetic frontiers between breeding populations of *Homo sapiens* and thus contributed to the rich variability of the human gene pool.

CAUCASOID SUBRACES

One of the earliest classifications of Europeans on the basis of multiple characteristics named three subraces: Nordic, Alpine, and Mediterranean (332). Other systems have multiplied those taxa by subdividing larger groups or adding more, and now over a dozen subraces of Europeans and other Caucasoids are recognized by some authorities (144;145;321;98). Of course, with such opportunities for mixing breeding groups as are presented throughout the widespread Caucasoid homelands, hybrid intermediates are plentiful, and the merging of subraces makes a selection of 'typical' features often difficult. There is a temptation to isolate atypical extremes, and this practice has, on occasion, brought the whole exercise into disrepute, aided by an understandable reaction against the misuse of racial identification for political ends. But the existence of intermediates or atypical extreme forms does not invalidate the idea of subracial groups, which has helped in the past to preserve in such populations their distinctive phenotypes and cultures.

Nordics

The most typical Nordics live in the part of the Netherlands north of the Rhine; in Germany along the north coast from East Friesland to Schleswig-Holstein and beyond the Elbe to Mecklenburg; in Denmark; Norway (except the south and southwestern coastal districts); Sweden; the Åland Islands; and the coast of Finland; also in the Faroe Islands and Iceland. The population of

Great Britain is largely of Nordic origin, but there was a considerable admixture of Mediterranean stock in ancient times and the proportion of typical Nordics in the population is not high.

In fact, there is a strong affinity between the Nordics and the Mediterraneans; they are morphologically closer than either is to the Alpines (155;144). The medium-to-long Nordic skull, for instance, is hardly distinguishable from the Mediterranean, but both stand poles apart from the round-headed (brachycephalic) Alpine (Fig. 17). The Nordic head also has a characteristic bulge at the back. In stature, however, the Nordic stands well above both the Mediterranean (173 cm or more, as against 161 cm; 5 ft 8 in against 5 ft 3 in) and the Alpine (164 cm; 5 ft 4 in). The Nordic is characteristically long limbed, especially in the legs, in contrast to the stocky Alpine. His colouring is generally fair, and his skin easily freckles in bright sunlight. His scalp hair is correspondingly blond to light brown or reddish in colour but inclines to early baldness. His eyes are blue or grey. Facial and body hair is sparse, and that of the armpits is generally ash-blond to reddish brown in colour and fairly abundant. Pubic hair matches the axillary in colour but is rather scanty in the female. The Nordic face is long with strongly developed bones; the nose is fairly prominent, straight and narrow. The chin is similarly strongly developed and prominent.

It is said that typical Nordics and Alpines differ as much from one another in the female external genital organs as in the skull. They are supposed to be sited lower and more to the rear in Nordic women; the labia, both majora and minora, are larger and the vagina and cervix longer than is normal in Alpine females (257). This observation lacks general confirmation, however. It has also been reported that the Nordic male has a larger penis than the Alpine, with a particularly long foreskin.

Alpines

The Alpine stock receives its name from the concentration of such peoples on a line extending from the Cevennes Mountains and the central massif of France, along the Alps, down through the Balkans, east into the mountains of Asia Minor, and thence northwestwards into Russia and Siberia. It has been said that the

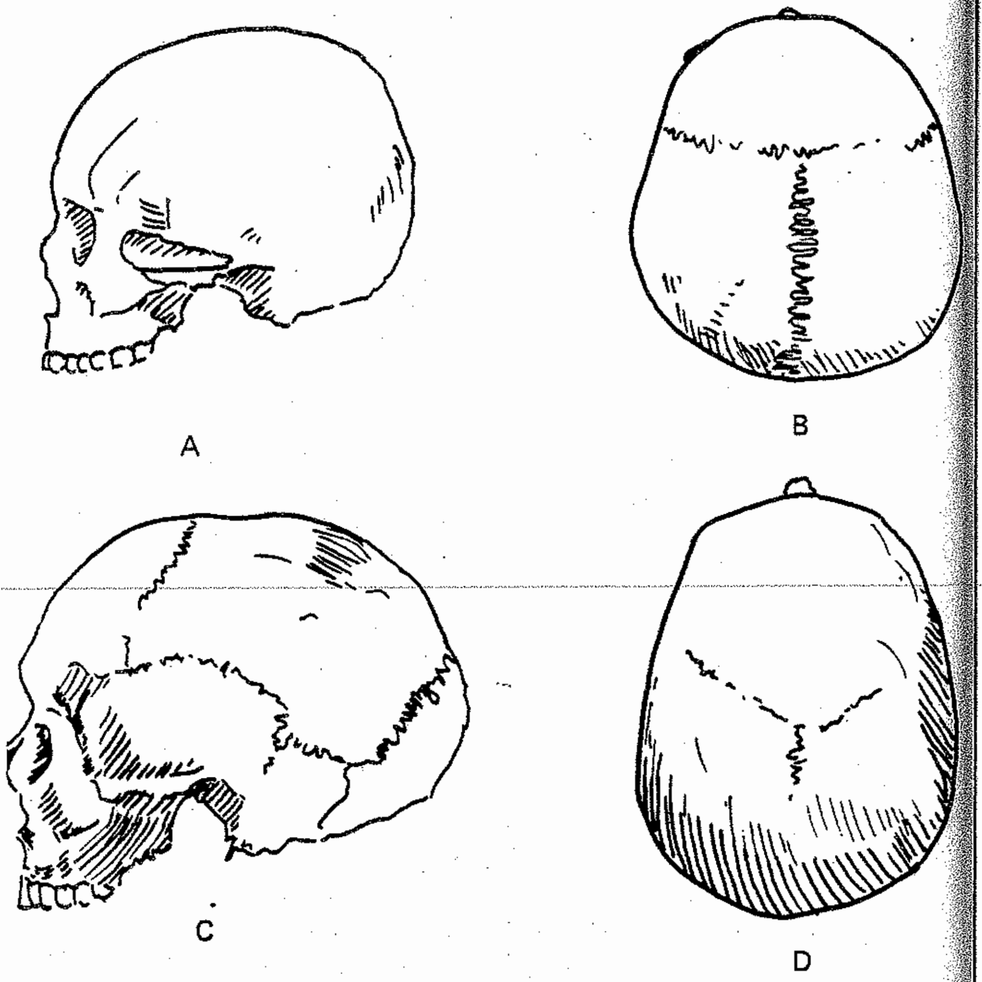


Figure 17. Alpine and Nordic skulls. A and B. Lateral and vertical views of an Alpine (Bohemian) skull (brachycephalic, cranial index 86.4). C and D. Nordic skulls (dolichocephalic, index 72.4 and 72.3, resp.). (After Baker, *Races*, p. 214, Fig. 28.)

most typical specimens of the subrace are to be found in the valley of the Rhine near its source in Switzerland, but the type occurs sporadically throughout Europe.

As one would expect from their situation between the Nordics in the north and the Mediterraneans in the south, the Alpine has inherited genes from both types. Nevertheless, he still retains some distinctive features, of which the most outstanding is the breadth of his skull (brachycephaly), some 85 percent of its length. The forehead rises steeply, and the skull is generally high-domed, particularly as it occurs in the eastern and more northerly areas, and has a somewhat high, curved occiput. The face is broad across the cheekbones, and round, being low in proportion to its width. The nose is prominent and, for Caucasoids, rather wide, with a fleshy, upturned tip. It also tends to be slightly concave, particularly among women. The face is generally orthognathous, that is, there is little forward protrusion of its lower part, except perhaps of the alveolar, the tooth-bearing part of the upper jaw. The palate is moderately wide and the chin well developed.

The other, immediately striking characteristic of the Alpine is the sallowness of his skin, although not quite so dark as the Mediterranean. Scalp hair is chestnut brown to black and usually straight, although sometimes wavy. Body hair is very abundant in the male, especially on his face. Eyes are brown, often with a greyish tinge. The Alpine's medium or short build is thickset, with a short, thick neck, broad shoulders, deep chest, and short limbs.

Mediterraneans

The classification Mediterranean embraces a large number of local types fringing the Mediterranean Sea and radiating outwards in all directions, as far as northern India. They include Portuguese, Spaniards, Frenchmen, Italians, Greeks, Turks, North Africans of many kinds, many Arabians, Iranians, Afghans, and Indians, all of whom have common elements in their physical makeup. As one would expect over such a wide range of climatic conditions, skin colour varies widely, from tawny white to dark brown, the predominant complexion being olive. Scalp hair is dark brown or black and varies in form from wavy to a loose curl; face and other body hair is moderately developed. The head is long (dolichocephalic), perhaps slightly more so than the Nordic norm; the face is gently oval and with little protrusion of the jaws. Ears tend to be small, lips thicker than the Nordic, and the chin only weakly or moderately developed. The forehead rises rather steeply, the high-ridged nose is possibly somewhat wider than the Nordic. The continuity of the forehead with the nose was much admired by classical sculptors, who exaggerated the feature to produce the so-called 'Greek profile.'

The difference between male and female physique is more marked in Mediterraneans than among Nordics, the Mediterranean women being rather wider in the hips.

The reader will have noticed that, in speaking of subracial characteristics, we have referred to traits that are of more limited phylogenetic importance than the skeletal features emphasized earlier. The soft parts of the body are not so easily related to fossil remains, but since these secondary characters are often those that impinge more upon the consciousness of the casual observer, as well as providing contributory tracer material for the anthropologist, it may be of interest to devote a chapter to them before going on to discuss the remaining major taxa of mankind.

Chapter Seven

FLESH AND BLOOD

> But the very hairs of your head are all numbered.
>
> MATTHEW 10:30

HAIR

Human nakedness has been much discussed and variously explained (299). Since the deprivation of a natural coat of hair must have acted against the hominid's survival in extreme weather conditions, either from heat loss in the cold or from unshielded solar radiation in the tropics, the presumption must be that our ancestors gained some important advantage from their naked skins that outweighed their climatic vulnerability. A better temperature control during short periods of intense effort, such as would have been demanded of the bipedal hominid in the hunting field, might be part of the answer. Perhaps, too, an increasing mobility over a wide area served by a developing culture reinforced the need for better adaptability.

In any case, whatever the reason for his loss of body hair, the degree of man's nakedness varies considerably with race and may reflect evolutionary status as well as geographic or climatic adaptation.

The male Caucasoid is a fairly hirsute animal, with abundant facial hair and generally extensively covered in other parts of the body. Compared with him, full-sized Congoids and Mongoloids have little beard and body hair, although dwarfed Congoids, the African Pygmies, are better supplied.

The main function of head hair is to help preserve the thermal equilibrium of the brain within its very narrow operating limits. Thus people with frizzy or woolly hair have a protective cover of matted fibres on their heads, trapping pockets of dead air that insulate the skin from the direct rays of the sun. Comparison has been made with the merino sheep in northern Australia, whose coats may reach 190 degrees in the sun on the surface but allow the skin beneath to remain within its normal functioning temperature (101;273).

On the other hand, as so often with human adaptive mechanisms, there are racially diverse ways of achieving the same effect, suggesting separate movements of different human (or hominid) stocks into similar environmental conditions. Mongoloid hair is quite differently formed in its cellular construction from, for example, that of the Pygmy, but both types afford the owners climatic protection. The insulation offered by pockets of dead air trapped in the tight curls of the Pygmy is matched by the air spaces contained between the cells of the *medulla*, or central canal, of each Mongoloid hair (290;291). Pygmy hair has small medullas, or none at all, like the hair of infants. Mongoloid hair is the thickest and straightest, as well as the stiffest of human hair, and most resembles that of the deer family, giving a maximum of thermal insulation per unit of bulk or weight (63).

Caucasoid hair is relatively unspecialized. Like that of the Australian aborigines, it tends to go grey before old age, and early balding is frequent. In its prime, Caucasoid hair is usually straight or wavy, a form that is determined by the straightness of the follicle from which it grows and the oblique angle at which it comes out of the scalp. This angle depends in turn upon the thickness of the *dermis*, which, with the *epidermis*, constitutes the two main layers of the skin; the thicker the dermis, the greater will be the angle and the rounder the hair in cross section (388). This transverse aspect of the hair is related to its degree of straightness or curliness; the Caucasoid hair is only roundly oval compared with the narrowly elliptic Bushman's hair, which emerges from curved follicles in a tightly curled and tufted condition (168).

FINGERPRINTS

Fingerprinting is best known for the part it has played in criminal investigation, but it is also of particular interest to the anthropologist (217). It was long ago realised that the patterns of ridges marking the grasping surfaces of the fingers and palms of hands, and the toes and soles of the feet, are unique to each individual and permanent; even between identical twins there are slight but distinguishable differences (107). Recorded in large numbers on a global scale, it has been possible to detect broad racial groupings of pattern types (101:258). Since a person's ridge patterns are established very early on in his foetal development, in the eighteenth week, there is no question of their being affected by later environmental factors, social or physical (290,291), and they must therefore reflect genetic inheritance.

The study of skin markings of this kind (*dermatoglyphics*) is usually confined to the end joints of fingers and thumbs for ease of recording. It is a simple procedure to record fingerprints, and it makes possible the collection and classification of a great deal of data with minimum expense and effort. Furthermore, fingertip impressions form readily identifiable patterns, while the ridges on the skin of lower finger joints, although also unique to the individual, run more or less transversely without offering specific patterns.

Fingerprints are classified for identification in a three-way process: first, by general shapes and contours; second, by noting finger positions of the pattern types; and third, by counting and tracing ridges. We lack sufficient data to use this last, much more detailed, method for racial comparisons on a global basis, but much research has been done on grouping populations in accordance with general pattern typing (350).

There are three general conformations of ridge patterns that are recognized for this purpose: arches, loops, and whorls (Fig. 18) (107). Arches are the least represented overall, with a mere 5 percent average of the samples taken worldwide (although, interestingly, with an incidence of over 10% among African Pygmies). Loops are in the majority among Caucasoids and Congoids, at 52 to 75 percent, and Mongoloids, including American Indians, seem to be more evenly divided between loops and whorls. Australoids are overwhelmingly whorl patterned, to a maximum incidence of 77 percent in the Northern Territory (106). Since the whorl is the more complex configuration, and a tendency towards simplification is to be expected in the evolution of such minor features, some authorities consider this trait in the Australoids to be another

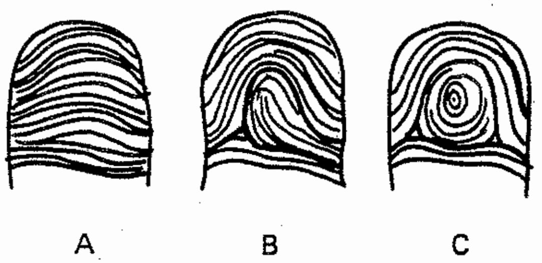


Figure 18. Three basic types of fingerprints: (A) arch; (B) loop; (C) whorl.

'primitive' character (20:298).

PTC TASTING AND NON-TASTING

During the 1930s, chemists discovered accidentally that certain substances could evoke a sharp, bitter reaction in the taste buds of some people and yet remain quite tasteless to others (160;365;36). The best known of these chemicals is phenylthiocarbamide, more commonly referred to as PTC; another with the same effect is phenylthiourea. Physical anthropologists and geneticists became interested in the phenomenon as providing another possible genetic tracer, for the inability to taste PTC seems to be an inherited trait, due to a recessive gene (283). Large-scale tests were carried out, administering carefully controlled doses of PTC to thousands of people of many lands and races, and to some apes, and assessing their reactions (294:386;350:63). Although it transpired that most people were able to detect the presence of PTC on their tongues, a significant number of people could not, and a definite racial pattern emerged. Caucasoids came about midway in the table, with some 30 percent of their number non-tasters. Mongoloids and Negroes have the highest percentage of tasters, approaching 100 percent in some populations. At the other end of the scale, Australian aborigines, Papuans, and Melanesians, that is, mainly Australoids, have the fewest tasters, with some frequencies well below 50 percent. Of twenty-seven chimpanzees tested, taken from various zoos, only seven were non-tasters, that proportion of 26 percent coming well within the range of human variability and similar to the Caucasoid result (152).

No certain cause has yet been found to account for the perpetuation of this recessive gene among humans, although the fact that it is also found among other primates might point to a considerable evolutionary heritage for the trait, extending back to our common hominoid ancestors. There has been a suggestion that the inability to detect the presence of naturally occurring thiocarbamides might have increased susceptibility to certain diseases, giving a positive selection for tasting a definite evolutionary advantage. It has been reported, for example, that among Caucasoids, non-tasters more than forty years of age are particularly liable to the eye defect glaucoma (27). There has even been a correlation between PTC taste reaction and dental caries (85). Rather better documented has been the connection between thiocarbamides and certain types of thyroid trouble, including goitre (244;17), and substances of this nature have been shown to occur naturally in such foods as turnips, brussels sprouts, rape, and especially kale. Milk from cows fed on kale during the winter is liable to contain goitrogenic agents (294:385).

It is possible, then, that the inability to taste PTC might indicate a genetic weakness for thyroid trouble and lead to a positive selection for tasting in those areas of the world where goitrogens in foodstuffs have posed a threat. All the same, the apparent distribution of tasting and non-tasting characteristics among the races is not easy to explain. In particular, the wide disparity between Mongoloids and Australoids cuts right across the east-west division that marks many other heritable racial features (101:264).

BODY CHEMISTRY

The existence in a population of more than one form for any genetic character, such as the tasting and non-tasting of PTC, is called a *balanced polymorphism* ('many forms'). The fact that both characters can coexist means that a balance has been reached where the advantages offered the individual by the possession of a genetic trait are not so overwhelming as to eradicate the alternative gene, or *allele*, responsible for its absence. We have already seen in connection with the 'sickling' trait that heterozygous conditions, where different alleles are found on two chromosomes, can offer a safeguard against disease, in that case malaria, without so disrupting the functions of the blood cells as to produce anaemia. On the other hand, a homozygous condition, where the same allele is found on both chromosomes, can prove fatal in infancy; sickling in such cases reduces the oxygen carried to the tissues from the lungs.

Another example of balanced polymorphism is in the presence of different kinds of *haptoglobin* in the blood. This substance, contained in the *plasma,* or fluid part of the blood, has the capacity to combine with haemoglobin, the oxygen-carrying vehicle (59). Ordinarily, haptoglobin does not come into direct contact with haemoglobin, but if a red blood corpuscle is damaged or decays, the haptoglobins 'seize' (Greek *hapto*) the haemoglobin and prevent its excretion through the kidney, with consequent loss to the body of precious iron.

There are two chemically distinct kinds of haptoglobin, called Hp1 and Hp2, determined by genes Hp^1 and Hp^2, respectively. A human being may possess Hp^1 in a double dose (1-1), or Hp^2 in a double dose (2-2), or single doses of both Hp^1 and Hp^2, and some people have no haptoglobin in their blood at all, whether from the presence of some recessive suppressor gene, or from disease damage, or environmental reasons (294:381).

The distribution of the various haptoglobin groups shows a definite racial division: Caucasoid populations are characterized by a comparatively low percentage of 1-1 and high 2-2, while Negroes are high in 1-1 and low in 2-2 (294:381). Specific samples taken from a group of 218 Englishmen and 99 Negroes gave the following results: the Caucasoids showed 10 percent with haptoglobin 1-1, 32 percent with 2-2, and 55 percent with both types; the Congoids gave 54 percent, 3 percent, and 11 percent respectively, in round figures. Only 3 percent of the British had no haptoglobins in their blood, but 32 percent of the Negroes were so deficient (10). Clearly, the variations in frequency in each population indicate that a true polymorphism exists and that a balance has been achieved in selecting the advantages of each haptoglobin type to suit its own particular ecological needs.

Proportional differences like these that illustrate relative gene frequencies within and between populations can be used to *characterize* ethnic taxa but not to *define* them, in the sense of determining the race to which a person belongs. They are thus 'secondary' characteristics, useful for their contribution to the overall picture of a taxon but not for distinguishing one from another.

In recent years an increasing amount of information of this nature has come from a study of differences in body chemistry between individuals of the same taxon, and even of the same family, and in proportionate terms between one taxon and another. This relatively new field has been eagerly seized upon by the geneticist and physical anthropologist, since biochemical characteristics are genetically transmitted and not individually susceptible to environmental influence (254).

Blood groups are perhaps the best known of such chemical variants, and thanks to their importance for medical research and practice, a mass of comparative data concerning gene frequencies for blood types is available from all over the world (350).

All human beings belong to one of four blood groups. These groups are distinguished by the reaction between the red blood cells of one individual and the serum, the blood's liquid, of another. Compatibility means that the blood cells remain distributed evenly in the serum; incompatibility results in their clumping together—that is, they *agglutinize.*

Red blood cells possess *antigens* called *agglutinogens,* of which there are two kinds, A and B. Blood serum contains *agglutinins,* of which, again, there are two kinds, anti-A and anti-B. Blood cells may contain either A or B or both (AB), or a fourth type, O. Blood serum has anti-A, anti-B, or both, or neither. Corpuscles containing A are agglutinated by serum having anti-A, while the cells with B are agglutinated by anti-B. People with A corpuscles do not have an anti-A serum but do have anti-B. People with O corpuscles have serum containing both anti-A and anti-B. AB people have neither. If the wrong blood is injected, that is, A blood into a B person or B blood into an A person, the red cells agglutinize through the agglutinins in the recipient's serum acting against the introduced corpuscles; they clog up some of the smaller blood vessels and cause the death of the recipient.

Most human populations have individuals of all four types, A, B, AB, and O, and even parents and children, as well as brothers and sisters, may belong to different groups. However, some blood groups, and thus the gene alleles that produce them, are more frequent in some countries and among some ethnic groups than others. For example, the gene for A blood increases in frequency from east to west in Europe, from 34 percent in Moscow to 42 percent in England, and that for B blood increases from west to east, from 8 percent in England to 25 percent in Russia. Blood of the B type is most frequently found in some populations of India, Tibet, Mongolia, and Siberia, but, strangely, considering their Asiatic Mongoloid origins, the lowest frequencies of type B are found in the Indians of North and South America and in Eskimos, all of whom are demonstrably related on archaeological and physical grounds. On the other hand, the American Indians, particularly those of the South, are strongly O type, and it seems likely that before the arrival of the Europeans and Africans in the New World the Indians must have been almost entirely of that group, as are the natives of Tierra del Fuego today. A group of Peruvian Indians registered an O-type frequency almost as high when, out of 8,112 persons tested, no less than 7,707 were shown to have this blood type (340). This very high proportion of O genes almost merits the designation of a primary characteristic (20:187).

Australian aborigines, like the Eskimos, are roughly half-and-half O-type; West African Negroes are mainly of that group (52%), but equally A- and B-type (21% and 23%). The Caucasoid Ainus of Japan are strongly B-type, at 38 percent, comparable with Asiatic Indians (37%) and Tartars (33%). The Congo Pygmies, along with Japanese and Egyptians (Caucasoids), most strongly represent AB people, with 10 percent of their populations. Of all the blood types, O is the most widely distributed; no population is without its representatives, the lowest frequencies being about 30 percent among Pygmies, Chinese, Russians, and Tartars (294:334).

Although at first sight the population tables for ABO blood groups seem to present an unpatterned confusion of gene frequencies, closer examination shows that the Mongoloids of Asia and America on the one hand, and the Caucasoids on the other, do form independent clusters pointing to some homogeneity in their respective origins (294:335). When other, more recently discovered blood group systems, like the Mn, P, Rhesus, Lutheran, Kell, Lewis, Duffy, and Kidd, are similarly tabled, it is possible to

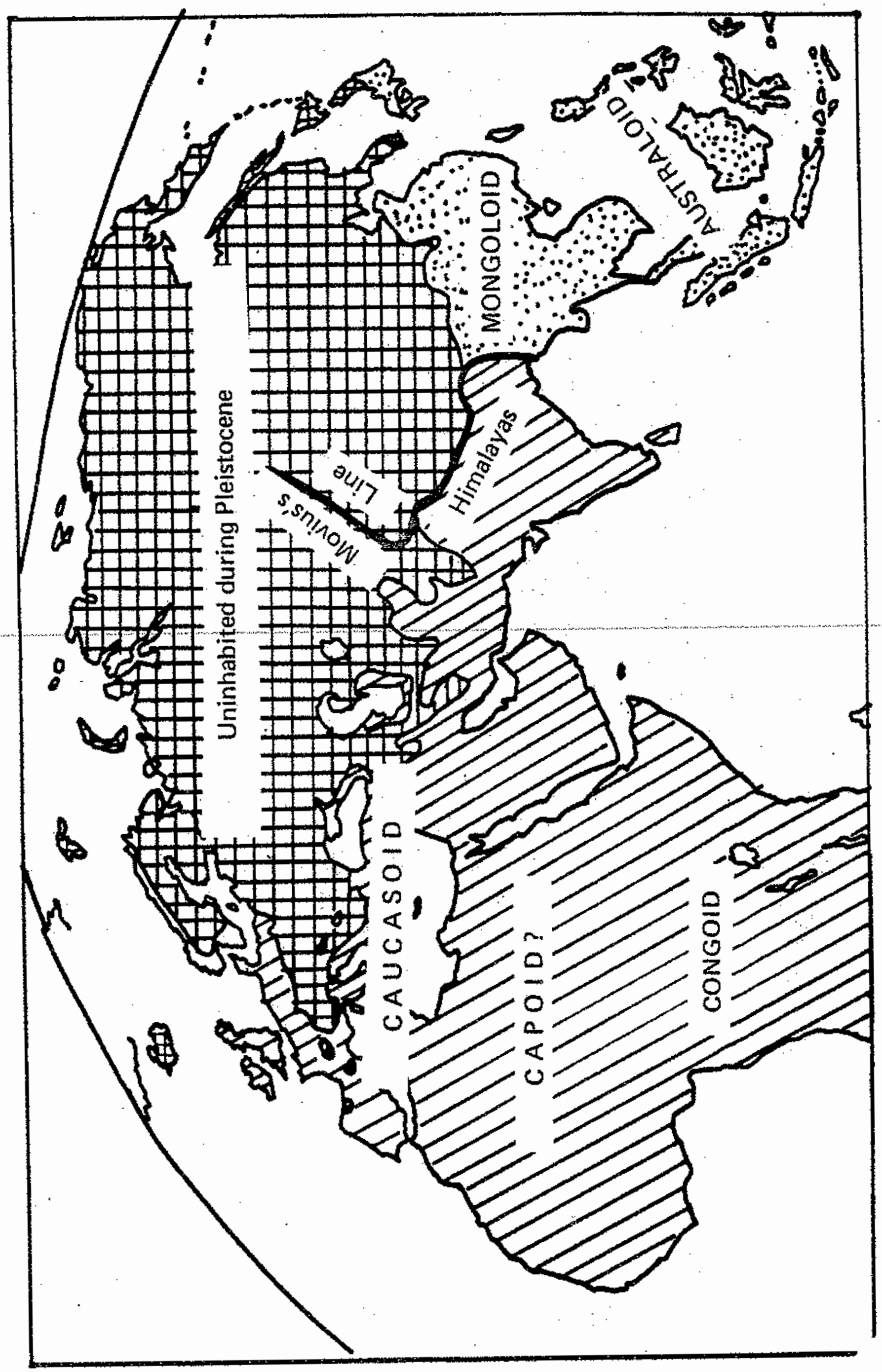


Figure 19. Racial distribution during the Pleistocene, and Movius's Line. (After C. S. Coon, *The Living Races of Man*, 1965, p. 28.)

discern a more comprehensive racial distribution on either side of a dividing line running down the spine of Asia, along the southern flank of the Himalayas, and south into the Indian Ocean (Fig. 19). On each side of this Great Racial Divide, or Movius's Line as it is sometimes called after its identifier (305), blood group affinities reflect cultural zoning: to the east Mongoloids and Australoids, to the west Caucasoids and Capoids (101:287).

For a clue to some of the selective pressures affecting the distribution and proliferation of blood groups, it is apparent that the greatest complexity exists where diseases are concentrated, in the wet tropics of the Old World on both sides of the line. The simplest patterns appear on the peripheries, where once people settled previously uninhabited places, particularly in Australia, Oceania, and the New World. Although it is as yet imperfectly understood, there does seem to be some correlation between blood groups and certain diseases (65;92). For example, it is said that gastric and duodenal ulcers tend to affect persons of blood group O; stomach cancer, cervical cancer, pernicious anaemia, and even diabetes mellitus are supposed to be commonest among those with A-type blood.

It is well known that parental incompatibility in blood groups can cause difficulties in reproduction, particularly in the matching of Rhesus (Rh) factors. The high mortality that might be expected among babies born to Rh-negative mothers should have selected against that gene and eliminated it from every population where its frequency was originally below 50 percent. In fact, this seems to have happened among most peoples living east of the Great Racial Divide. No American Indians, Papuans, or Australian aborigines are Rh negative, and few Chinese (1.5%) or Japanese (0.6%) (294:352). But among Caucasoids and Negroes the Rh negative gene is present in all populations studied. Some counterselective factors must have operated to have kept it from disappearing in these subspecies, either by offering protection against some other hazards or, more positively, by giving Rh-negative mothers, when compatibly matched in their mating, an added fertility. There is some evidence to support the idea; it appears that Rh-negative persons enjoy some measure of protection against rheumatic diseases (394), and, when married to genetically compatible men, Rh-negative women bear more children over a longer period than their Rh-positive sisters (313).

Some similar selective mechanism probably accounts for the virtual elimination at one time of the AB groups in the New World. Certainly some occasional difficulty is experienced in pregnancies involving a group O mother bearing a foetus of another group, in particular when anti-A is formed in the mother of an A_1 (a subdivision of A group) foetus. Clearly, the protection afforded the minority group AB must have warranted its survival in those populations not so completely dominated by O group as the Indians of South America. The same selective processes must have operated in support of human blood group diversity everywhere—disadvantages in a limited range of mating compatibility being matched against a measure of disease resistance or enhanced fertility (101:285).

The Caucasoid subracial blood grouping presents as mixed a picture as that of any of the major ethnic taxa of mankind. This is hardly surprising in view of the highly diversified geography of the Caucasoid homelands and the cultural advances that have enabled the various subraces to mingle over the past few centuries. Nevertheless, the persistence of characteristic blood group frequencies within populations has proved valuable in the tracing of tribal movements. For example, investigators found that a colony of gypsies living in Hungary had a strikingly higher B group frequency than that shown by other Hungarians, and that it conformed more closely to the blood grouping of Hindus from northern India. Further research into the gypsies' background showed that their ancestors had in fact migrated from India some 500 years earlier.

Again, the same investigators found a group of Germans living in Hungary whose ABO frequencies more closely resembled those of the inhabitants of Heidelberg than those of their Hungarian neighbours. It transpired that the Germans were descended from migrants who had, in fact, come from Heidelberg 200 years before (294:335).

During World War II a drive for blood donors in North Wales brought to light the curious fact that people with Welsh names in that area were more likely to have O- and B-type blood than their neighbours with English names. Further investigation showed that northern and southern regions of that principality differed in respect to blood groups; those of the northwest resembled their ethnic brethren in Scotland and Ireland, while those of the south, whatever their names, had almost as much A-type blood as the southern English (303;304). In the extreme southwest of Ireland, the ratio between O and A blood was even higher. The inference seems to be that a Neolithic, predominantly O-type people, left their genetic traces among these populations, having been driven to the more remote areas by an A blood invader from the east (269). This intruder would seem to have already entrenched himself in Scandinavia, as well as in Spain and Turkey.

The ethnic affiliations of the people who sought refuge in the hills of northwest Wales and elsewhere in the British Isles may be traced by their low A-type and high O-type frequencies to the Mediterranean area, especially North Africa, Corsica, Sardinia, southern Italy, and Sicily (304;32). This would tend to confirm the opinion, long held on other grounds, that the ancestral stock of the dark-eyed, black-haired Welshmen and their so-called 'Celtic' blood-brothers elsewhere (28) were a Mediterranean subrace and not real Celts in any true anthropological sense (32;20:269).

There has been an interesting correlation made between the ability to pronounce the various sounds of the *th* group, as in the words *this* and *thick*, and the possession of O-type blood. Although the choice of one's native language will obviously depend to a large extent on circumstances of birth and local culture, there is some genetic element involved in the actual process of pronunciation, since phonetic capability must depend to some degree on inherited anatomical characteristics (146;61). As we all know, new residents in a country can soon learn the local language and make themselves understood, but they cannot so easily overcome their own phonetic limitations; however good their 'accent', difficulties with some sounds will almost always betray their alien origin. The history of past migrations in relation to the changes in the distribution of *th*-pronouncing ability has shown that difficulty with this sound has spread with the arrival of populations from the east. Among Caucasoids a low frequency of *th*-speaking is found among the Alpines, East Europeans, and Armenians, while most

th-speakers appear among Nordics and Mediterraneans significantly corresponding with O blood group distribution (115;116).

As we saw above, B group people become more numerous the farther one moves away from western Europe towards Russia and into the Middle East. A combination of historical, anthropological, and serological evidence indicates that B-type genes were probably introduced into Europe, or considerably augmented there, by invaders from Asia between the fifth and fifteenth centuries (73). The predominance of A-type blood in Europe today demonstrates that, whatever their cultural impact, these newcomers by no means succeeded in ousting the incumbent population.

Chapter Eight

ACROSS THE GREAT DIVIDE

> Oh, East is East, and West is West, and never
> the twain shall meet,
> Till Earth and Sky stand presently at God's
> great Judgement Seat;
> But there is neither East nor West, Border, nor
> Breed, nor Birth,
> When two strong men stand face to face, though
> they come from the ends of the earth!
>
> RUDYARD KIPLING
> *The Ballad of East and West*

MONGOLOIDS

The Mongoloid homeland, including those areas of northeastern Asia and the New World where the Mongoloids were the first settlers, is a vast terrain covering half the habitable world. Its heartland is China, and it is there that the Mongoloids first evolved. Those who believe that *Homo sapiens* descended from more than one stock of hominids look to the Chinese population of *Homo erectus,* represented by Peking man (*Sinanthropus*), for the parentage of the modern Mongoloid subspecies (401;100;101). Certainly, for all their wide dispersal from Madagascar to Tierra del Fuego, the Mongoloids are remarkably homogeneous and, at the same time, the most highly differentiated from all other races of man, a clear indication of a common origin.

Skin colour among Mongoloids varies regionally with latitude in both Asia and the Americas, as one might expect, but the range is not so great as among the Caucasoids; it extends from sallow brunette to reddish brown. Eyes are brown, in keeping with characteristically black hair, with red undertones in some populations. Individual hairs are straight and coarse, large and tubular in cross section. Baldness is rare, and grey hair appears only with extreme

old age, if at all. Body and facial hair, on the other hand, is very sparse, with fewer hairs per square centimetre of smooth skin than in any other variety of man.

The Mongoloid head is, in general, brachycephalic, especially among the southern Chinese, Koreans, and Japanese, with an average cephalic index of 85, which, as we noted, was the ratio of head breadth to length for the broad-headed Alpine Caucasoid. But less rounded heads do appear among other Mongoloid populations, particularly in northern China, ranging from mesocephalic to dolichocephalic, that is, middle–to long-headedness.

Foreheads are of medium height and smoothly rounded. The back of the head, the occiput, tends to project, and this deep curvature of the occipital portion of the cranial base gives the head a larger brain capacity than usual. In fact, the Mongoloid brain is among the largest found anywhere; a capacity of 1,700 cc is not uncommon, against a human average of approximately 1,350 cc.

The Mongoloid nose varies in shape from the common flat variety of southern China, Southeast Asia, Indonesia, Siberia, the Eskimo lands, and the Amazon region, to the beaked, 'aquiline' nose of the American Indians and some tribal Asiatic peoples, like the Nagas of Assam. The flat type is depressed at the root, the bridge being sometimes so low that the surfaces of the eyeballs protrude beyond it.

The features by which the Mongoloids are most commonly typified are their 'high cheekbones' and their 'slant eyes.' This last feature is due to their fat-padded lids having an internal eye fold covering their inner edges (Fig. 20). Of more interest, phylogenetically, are the facial bones immediately below and to the sides of the eye sockets. Their characteristic protrusion is strongly reminiscent of Peking man, the Chinese hominid of the Middle Pleistocene, and has to be included in a long list of similar morphological correspondences between this fossil and modern Mongoloids (400;100:459f.,495). These forward-jutting *zygomatic* (from a Greek word meaning 'yoke') bones make it possible for the chewing muscles that connect with the lower jaw to deal with the heavily emphasized front dentition of the Mongoloids. As we noted earlier, their incisors and canines in the front of the mouth

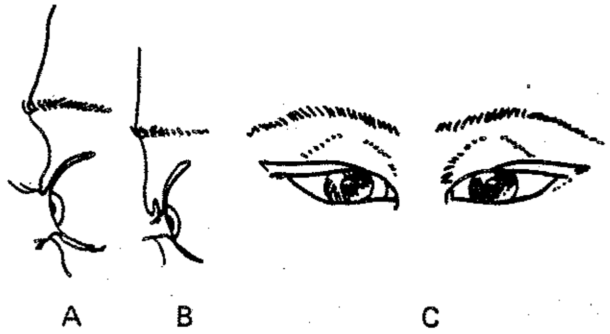


Figure 20. Caucasoid and Mongoloid eyes. A and B. Diagrammatic view of Caucasoid and Mongoloid eyes, resp. C. Mongoloid eye, front view. (After E. Baelz, *Z Ethnol 33*, 1901.)

are particularly large and elaborately braced for hard work, whereas the molars at the rear tend to taper off in size from first to third.

Another set of chewing muscles, the *temporal*, are attached at the front to the frontal bone (see Fig. 12), where they invade the forehead on each side, above the outer halves of the eye sockets, making it appear narrow and depriving the orbits of some of their depth.

These developments are seen at their most extreme among the hard-chewing peoples of the far north, like the Tungus of Siberia, and the Eskimos (316). Moving south into warmer climes, the selection that governs this condition is relaxed. Nevertheless, the characteristic Mongoloid facial 'flatness' still persists, in marked contrast to the pointed, sometimes beaklike face of the Caucasoid (407;100:364).

Facial flatness is of some importance as a race marker. It appears to have little to do with evolutionary grade or, despite its obvious advantages in avoiding frostbite on exposed facial extremities, with climatic adaptation (223). But it does reflect racial diversity, putting Caucasoid and Mongoloid facial skeletons, with their European and Chinese ancient progenitors, at opposite ends of the scale (407;100:495).

Beneath the nose, there is a marked tendency among Mongoloids towards *alveolar prognathism;* that is, a projection of the tooth-bearing portion (Latin *alveus* 'cavity') of the upper jaw, slightly forwards and upwards. Added to this, where among Mongoloids there has been a relaxation in selection for heavy chewing capabilities, both upper and lower incisors jut forward, giving the 'buck-toothed' appearance of so many Japanese, in particular. This so-called *psaliodont occlusion* (Greek *psalis,* 'a pair of shears') is the Mongoloid response to the same kind of dental situation that gave the Caucasoids their 'overbite.'

In the shape and structure of the teeth themselves, the Mongoloids display certain distinctive peculiarities. One of the most remarkable is the phenomenon known as 'shoveling,' in which the tongue, or *lingual,* side of incisor teeth appears to be 'scooped out.' In a mild form the inside lateral edges of the tooth are bent backwards to form a pair of rims, leaving a concavity within. In more extreme shoveling, the edges are wrapped around to such an extent that, looked at from the biting edge, the tooth looks like a flattened 'C' lying on its side, the gap facing inwards. In this 'prone-C' type, the borders can meet at the root end and part company halfway up the tooth, or they can be fused, giving the tooth a tubular, or barrel, shape (see Fig. 9A).

Another extreme form of shoveling is to be seen among southwestern American Indians, where a concavity on the lingual side of the tooth is matched by another on the front, or *labial* (lip), side (100:356). In contrast, Caucasoid incisors generally have the biting edges of the incisors shaped like chisels, and shoveling is very rare. Among Mongoloids the incidence reaches a frequency of almost 100 percent, and again, it is characteristic of Peking man's dentition (401:84).

An additional curious feature of Mongoloid teeth is the so-called premolar 'cone,' a rod– or teatlike excrescence of enamel protruding from the centre of the groove in the middle of the biting surface of a premolar tooth, usually the second, in the lower jaw. It is, of course, soon worn down and is therefore only discernible in a newly erupted tooth (see Fig. 9B through D) (100:357).

Other occasional Mongoloid dental peculiarities, although not necessarily specific to that race, include the *cingulum,* a partial or complete rim like a collar about the base of the crown of any tooth except the incisors (see Fig. 9F, G) (100:358). Also, a wrinkling of the enamel on the normally smooth surface of the molars is sometimes visible in Mongoloid teeth (see Fig. 9E). This seems to be a 'primitive' feature, seen also in the fossil teeth of *Australopithecus*, and in living orangutans (100:358). An enamel 'pearl,' or excrescence, on the labial side of a molar tooth is a common (30%) feature of Eskimo teeth, although it is also found among the Caucasoid Ainu of Japan and the African Bushman (Capoid) (100:357).

More specific to the Mongoloid is the extension of the normally level border of the enamel of the molar crown onto the neck of the tooth, and down onto its root, in some cases reaching into the gap between the forks, and even at times to the root's very tip (see Fig. 9H, I) (100:358). Like other such dental abnormalities, this extension of the enamel adds a measure of protection to the tooth, particularly where chewing on the side renders it liable to undue wear.

The roots of Mongoloid teeth tend to be short for the size of their crown, a characteristic also of the Caucasoid Lapps, and molars have sometimes one or more extra roots to brace the forward part. We have already mentioned the Mongoloid tendency to molar reduction, and it is sometimes carried to the point of losing the third molars altogether; this must be regarded as a progressive trait and is rare in other races. Significantly, the Australian aborigines not infrequently have additional molars in either jaw to enhance the rearward emphasis of their more primitive dentition.

The distinctiveness of the Mongoloid facial skeleton, including the jaws and teeth, can only be partly accounted for by environmental adaptation, or the persistence of more generalized primitive traits; much more significant is its phylogenetic correspondence with similar features in the Chinese hominid, Peking man. The modern Mongoloid seems to have inherited from his Middle Pleistocene predecessor the heavy frontal emphasis of his dentition, with its skeletal accompaniment of projecting cheekbones, narrow forehead, and occasional alveolar prognathism. This orientation of the facial structure contrasts with the features exhibited by the fossil hominid of a much earlier date from Java; he seems to have had more in common with the modern Australoid, whom some authorities consider his phylogenetic successor (100:446).

Mongoloid body build is variable, tending towards a long trunk and short limbs, with particularly short forearms and lower legs. Stature varies from an average of 158 cm (5 ft. 2 in.) among some Japanese groups, to 168 cm (5 ft. 6 in.) among the northern Chinese. Mongoloids are straight backed, with little lumbar curvature; their chests are large, and they have narrow hips. Wrists are small, as are hands and feet in most populations.

The whole body skeleton of the classic Mongoloid is very delicately made, even down to details of the cranium, whose smooth and untortuous sutures seem strangely infantile. In fact, as was noted in Chapter Two, there are many aspects of the Mongoloid face and body that appear 'babyish,' even foetal in character, including the low nose root, the 'almond' eyes, the internal eye fold, the large brain pan, the smooth forehead, the body's hairlessness, and so on. As was discussed, we owe some of our ability to adapt to the needs of human status to the retention of foetal, or infantile, features into adult life. Insofar as the Mongoloid exhibits his particular paedomorphic traits, he may be reckoned to be a highly evolved specimen of *Homo sapiens.*

This conclusion has been drawn from the Mongoloid's characteristic lack of apocrine glands. There seems to be an interesting correlation between the degree of development of these scent organs and the type of wax produced by the ceruminous glands in the ears. This is said to have a distinctive smell (2), but its prime function may be to repel insects by its action on their taste organs (347), and the wax is differently constituted in the various races (277;278). In those populations where the *a*-glands are abundant, like the Caucasoids and Congoids, the earwax is soft and sticky. But where the *a*-glands are only weakly developed, as in the Mongoloids, the earwax is characteristically dry (2). Since the gene for sticky earwax is dominant over the alternative for the dry variety, we must presume that this Mongoloid characteristic is the result of a positive action of evolutionary selectivity and is thus an 'advanced' trait, along with the reduction in apocrine glands and general lack of body hair.

The fact that some anthropologists find in the Mongoloid phenotype features that they can relate directly to a peculiar and specialized racial stock of *Homo erectus* does not necessarily conflict with this idea of the Mongoloid's advanced evolutionary status. Neither, for that matter, does it mean that the Mongoloids derive their genotype exclusively from Peking man, or that other races may not have obtained, through various channels, some part of their genetic makeup from this stock of hominids (400:253). There could have been some Last Interglacial (Riss-Würm) or Early Würm contact between the Mongoloid homeland and the Caucasoid Neanderthal population (see Appendix). It has even been suggested that it was only then that a flow of genes between these peoples initiated the transition from *erectus* to *sapiens* in the eastern hominid population. In return, the invader from the west could have inherited some of the cold-adaptive traits that enabled him to survive the oncoming glacial period (100:522).

AUSTRALOIDS

The Australoids are perhaps more interesting to the anthropologist as survivors of a past stage in man's cultural and evolutionary history than as representatives of a major human taxon. They are a sadly diminished race. When the European colonists arrived in Australia in 1788, there were estimated to be 500 tribes of aborigines, each with their distinctive dialect, comprising some 350,000 persons. Now there are about 45,000 full bloods, of whom no more than 4,000 are living independent of white colonial settlements. It is said, however, that numbers are on the increase, thanks in part to the measure of protection they have been somewhat belatedly offered by the government.

The original Australoid settlers arrived probably in several waves, beginning in the latter part of the period represented in Europe by the Würm glaciation, approximately 18,000 years ago (308). At that time, the now submerged Sahul shelf joined New Guinea with northern Australia, and Timor and the Australian coast were no more than 100 miles apart. The Pleistocene evolution of the Australoids had probably taken place in Southeast Asia and Indonesia, and, as we noted earlier, some authorities see in Java man the pre-*sapiens* stock from which they came. These areas were cultural backwaters, and the slow evolution that began there continued with no more sense of urgency in the new homelands, whatever the source of those genetic contacts that initiated the

transition to *sapiens* grade.

Before the coming of the white settlers, the aborigines would appear to have achieved an ecological equilibrium, matching their numbers and distribution to the limited resources of their tribal territories (309). Theirs was a Stone Age economy with no agriculture, and the range of their nomadism was determined by the availability of food supplies. The absence of formidable predatory animals meant that man had no competitors in the field to help him sharpen his skill and wits in the kind of brain-versus-brawn battle that daily engaged his more advanced cousins in the northern hemisphere. The lack of horned, antlered, or tusked animals among the country's fauna severely restricted the availability of raw materials for artifacts, such as were enjoyed by other hunting-and-gathering communities. Even flint and similar fine-grained rocks were rare, and the quartz or quartzite the aborigines used did not allow the progressive refinement of tools and weapons achieved by other palaeolithic artisans.

Aboriginal culture knew nothing of houses, tombs, grave furniture, ceramics, metals, or precious stones. For domestic animals they had only their camp dog, the dingo, brought with early settlers some 6000 to 8000 years ago. The primitive nature of their existence thus offered no intellectual stimulus to experiment with new techniques or to compete with other human populations for the prizes of a less marginal economy and a sophisticated culture. They remained in their balanced, self-sustaining, evolutionary backwater to serve the twentieth-century anthropologist as a living museum of Stone Age economy and primitive human morphology.

Among the Australoids are to be found some of the most archaic-looking human beings alive today, but their primitive physiology is not confined to outward appearances. In our consideration of the Caucasoids, we have referred to several contrasting features among modern Australoids, such as the sharply demarcated orbital cavities, the short suture of the lacrimal bone, the dorsally thickened centra of the Australoid spinal column, and the intermediate development of the sacrum, between ape and Caucasoid. We noted also the preponderance of whorls over loops in the Australoid fingerprint patterns (possibly a primitive characteristic), the lower proportion of 'tasters,' and the blood group affinities with Mongoloids on the east of the Great Racial Divide.

More easily recognized are the Australoid's strongly developed brow ridges, often continuous across the central point, or *glabella.* Consistent with this feature is his receding forehead, and the 'ill-filled' cranium, flat sided, and often sloping outwards to give the skull's greatest width very low down. Running longitudinally along the top of the cranium is a sagittal ridge, from which the skull bone falls away on both sides like a low-pitched roof. 'Long-headedness' (dolichocephaly) can be quite extreme, giving an index as low as 70, the ratio being more the result of an extreme narrowness of the skull than of any great length. Peking man had a cranial index of only 72, and Java man was also dolichocranial.

The Australoid occiput at the rear of the skull has a pronounced bulge, with strong transverse ridges for muscle attachment. The lower face shows a marked prognathism, with a massive jawbone and large teeth, and a weakly developed chin, all pre-*sapiens,* hominid features. The braincase is also massively constructed. The bones are probably thicker and heavier on average than those of any other race. The cranial capacity, however, is low, with a mean figure of 1,280 cc, comparable with Peking man's 1,300 cc and the average Caucasoid's 1,350 cc. The Australoid's brain on the average weighs only 85 percent of the Caucasoid's, and the convolutions of the cerebral hemispheres are said to be simpler in their arrangement (338).

There is one point of detail that has been observed in some Australoid brains which arouses particular interest. At the rear of the brain in monkeys, especially those of the Old World (Cercopithecidae), and in apes, the visual area is extended round to form a crescent-shaped furrow, called a *lunate sulcus,* in the outer surface of the occipital lobes. If the observations reported are correct, this apelike feature also occurs in Australoid brains, and in a form closer to the cercopithecid and pongid condition than has been found in any other human taxon (Fig. 21) (141;20:292).

The Australoid's temples are concave; the frontal region is narrow, accentuating the flaring zygomatic arches, those extensions of the cheekbones on either side of the orbits. The eyes are deep-set, the nose broad and large, with a fleshy tip. The charac-

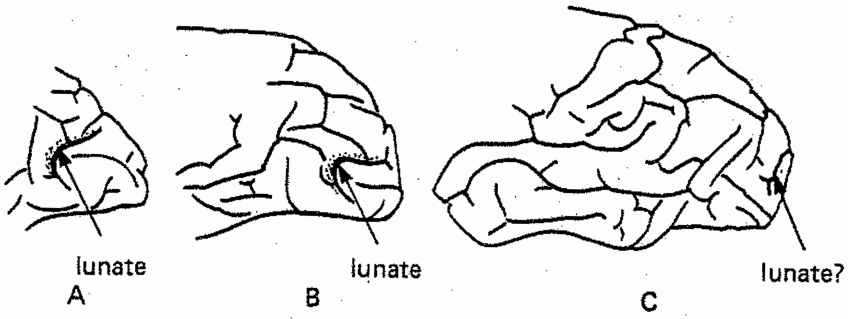


Figure 21. The *sulcus lunatus;* the posterior parts of the cerebral hemisphere of (A) orangutan; (B) Australoid; (C) Caucasoid.

teristic depression at the root of the nose, with the hourglass appearance of the nasal bones, has already been noted. Lips are full, but not everted like the Negro's.

The Australoid's average height is about 165 cm (5 ft. 5 in.). The trunk is generally short and the legs exceptionally long, although there is a regional variation of stature. In the rain forest of northeast Queensland, pygmylike aborigines have been observed with an average height of only 155 cm (5 ft. 1 in.) (179), while in the far north around Darwin, which is the warmest and dampest region of the country, the aborigines reach an average height of 171 cm (5 ft. 7 in.) (222). Australoids have neither the lumbar curvature of the Negro nor the straight back of the Mongoloid, and as one moves south, the legs are shorter and trunks longer and thicker, and the necks are shorter. Furthermore, in these more southern regions, the smooth, hairless skin of the northern aborigine gives way to an abundance of body hair.

Scalp hair is normally wavy and closer in form and appearance to that of the Caucasoid than to Congoid or Mongoloid hair. Nevertheless, curly, woolly, and straight forms are not infrequent among the Australoids and could be the result of some gene mixture (380). On the other hand, the incidence of curly, matted hair is highest in cool, damp regions, such as the rain forests of northeast Queensland, where it might be reckoned to serve an insulatory function and so be an adaptive trait. Facial hair is similar in amount to that of most Caucasoids.

Hair colour is typically dark brown or black, with eyes to suit.

There is some regional variation in skin colour, ranging from nearly black in the north to light or medium brown in the south, particularly in the desert, where blondism is not infrequent (222;21;22;243;1). This, again, is not entirely unexpected in view of the reflective properties of lighter tones in direct sunlight.

Newborn aborigine babies are quite light skinned, and full pigmentation is only reached at the age of three years, except in the mucous membrane of the mouth and in the glans penis, which darkens later (1). In fact, the aborigine's dark skin seems a much less constant factor than that of the Negro and may be genetically less dominant (179). Skin that has been protected from the sun throughout life is not much darker than that of most Europeans. Hybrid offspring of Australoid and Caucasoid parents scarcely differ from the latter in skin colour, and a further generation with a white parent removes even that measure of colour differentiation (180).

The breasts of Australoid women are said to be distinctive in the shape of the areola surrounding the nipple. Whereas among Caucasoids and Mongoloids this modified skin follows the curve of the rest of the breast, among Australoid women it is raised up into a projecting dome (Fig. 22) (371). This feature, sometimes known as a 'primary mamma,' or a *mamma areolata,* may have sexual attractiveness as its purpose, like the swollen areolae of Bushmen girls in puberty, which are said to make their nipples look like bright orange balls only loosely attached to their breasts (101:112).

A glance, then, across the Great Racial Divide of Movius's Line has shown us two major taxa of mankind, the Mongoloid and the Australoid. The latter may be sadly dimished in numbers now, but the former grows daily and, at some 1½ billion people, represents 37 percent of the world's human stock, covering half the habitable area of the globe. For all their wide dispersal, the Mongoloid subspecies, in their various subraces and populations, are remarkably homogeneous, and yet they are the most highly differentiated from the rest of mankind. The distinctiveness of the Mongoloid and Australoid races gives added credence to those anthropologists who have suggested that they originated directly from hominid stocks represented by fossil remains from China and Java.

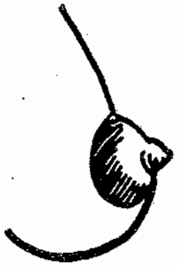


Figure 22. An Australoid woman's breast: an example of a *mamma areolata.* (After O. Finch, Z Ethnol, 12 (1880) 301–32.)

No serious estimate of future world politics can fail to take into consideration this fundamental cleavage in phylogenetic origins between east and west, Mongoloid and Caucasoid. Our obsession with the much less radical differences in skin colouration should not lead us into underestimating the profound distinctions that mark and divide these two taxa, of far greater significance than those characterizing the races of African origin, with which we are about to deal.

Chapter Nine

AFRICA

Ex Africa semper aliquid novi.
There is always something new out of Africa.
Pliny the Elder
Natural History, VIII, 17

Darwin considered Africa to be the cradle of mankind, and recent discoveries in the east and south of that mighty continent might have proved him right. But if *Australopithecus* was born there, he achieved full development in other regions of the world. Possibly the hominids needed some more piercing climate to stimulate the processes of their developing brain; certainly no great independent civilization ever originated in Africa or is now likely to do so. As one anthropologist has put it, 'if Africa was the cradle of mankind, it was only an indifferent kindergarten. Europe and Asia were our principle schools' (100:656).

Today, Congoids number less than ¼ billion persons, some 6 percent of the world's population. However, since one of the chief characteristics of the race is their ability to adapt to life in places far from their African homeland, the Negro and his kin have become familiar figures in many countries.

The name Congoid is intended to designate the so-called 'True Negroes' of West Africa, together with the Pygmy populations of the central African rain forests. The term has a useful geographical connotation, indicating the homeland of the typical Negro, whereas the possible alternatives, 'Negroid' or 'Negrid' perhaps place undue emphasis upon one aspect of the Congoid phenotype, the dark skin colour (Latin *niger, nigr-*, 'black'), which is shared by a number of other deeply pigmented taxa.

The origins of the True Negro are obscure, and it may well be that it is the little Pygmy who is the more original inhabitant of the central areas, and that the full-sized Negro is himself a product

of very ancient mixing between Pygmy and Caucasoid basal stocks, with a possible early infusion of Capoid genes (395;101:123). In any case, it is the West African Negro who is best known to the world at large, for it is mainly from that population that native and foreign slavers have recruited their labour forces for work in alien lands. The rest of the Negro population of Africa consists of tribes to the north, east, and south, who bear unmistakeable traces of racial mixing, deriving some part of their genetic heritage from Caucasoid Arabs and Berbers in the north, Hamitic-Ethiopian Caucasoids in the east, and Capoids in the south.

Negro racial characteristics with which we are most familiar include, as well as the deeply pigmented skin that extends even to the lips and gums, the rounded, heavily boned, dolicephalic-to-mesocephalic skull (index 73–75); a bulging occiput; a bulbous forehead; slightly protruding eyeballs, pigmented in the sclera; dark brown eyes; small, close-set tightly rolled ears; a broad, flat nose with wide nostrils; thick and everted lips; protruding jaws; and large teeth. The Negro body build is very special. A young person, in good health, carries little subcutaneous fat; with an average height of 173 cm (5 ft. 8 in.), he has broad shoulders, a short trunk, and narrow hips. There is often a considerable incurving of the spine (*lordosis*), with its associated protrusion of the buttocks. His limbs are long, especially the forearms and lower legs, and his muscles, particularly of the calves, are short and thick-bellied, with long tendons. Hands and feet are large, foot arches flat, with thick underlying fat pads. Negroes have unusually flexible joints and can, for instance, bend their thumbs back to an extraordinary degree. Facial and body hair is moderate to sparse; the skin is glossy and well endowed with apocrine, or *a*-glands. Head hair varies from a young, 'peppercorn' type, that is, sparsely distributed tufts over the scalp, to a more adult, tightly curled form.

With genetic infusion from other races, the Congoid type undergoes considerable modifications. For example, the homogeneous inhabitants of the Sudan and Upper Nile Valley ('Nilotids') are probably a product of a past mixture of Congoid and early Ethiopian (Caucasoid) stock. They are among the darkest of all human taxa; the cornea of the eye is pigmented, and even the tongue is spotted brown. They have long, narrow heads (index 71–74), with a bulging occiput and only feebly marked brow ridges. The face is not prognathous, and the chin is well developed. The nose has a definite bridge and is sometimes as narrow as that of the Caucasoid, although the *alae*, or 'wings,' of the nostrils are more sharply spread and separated from the rest of the nose and from the cheeks. The lips are strongly everted but look flattened as if pressed in from the front, and not bulbous as in the True Negro.

The Nilotids are a tall people, with an average height of 177 cm (5 ft. 10 in.) or more, slim, with very long limbs and relatively even longer forearms than the Negro. The lower leg is thin and almost devoid of calf, with the negroid tendency to a projecting heel even more pronounced (333). It has been remarked that, even when flaccid, the penis is particularly long and thick compared with the European organ, but this claim has been made for Negroes in general (379) and is widely disputed.

The short, stocky, barrel-chested 'Forest Negro' who inhabits a wide area of tropical Africa, from the Senegal River on the west to the Sudan on the east, is another type again. His origins are believed to be a result of a miscegenation of negroid and Pygmy blood. In stature he represents the opposite extreme of the Nilotic Negro, varying in height between a mere 165 cm (5 ft. 5 in.) and 175 cm (5 ft. 9 in.). He has short limbs with a long back, a short neck, and a shorter, more mesocephalic skull than the True Negro, since the back of his head does not project to the same extent. His brow ridges overhang his eyes, making them look sunken, and his forehead slopes back. His face is short and wide, with prominent cheekbones and some prognathism. His nose is flattened at the root and widens out below into a characteristic 'funnel' shape above strongly everted lips. His skin is somewhat paler than that of the True Negro, doubtless as a result of his more shady habitat in the forests. His facial and body hair is more developed.

PYGMIES

If, as has been suggested, the Pygmies are the longest-established subrace of African Congoids, it seems particularly unjust that today they are the fewest in number. The largest group is the Bambuti tribe of the Ituri rain forest of Zaire (Congo), near the Ugandan border. They number around 40,000, and the total Pygmy population of Africa may not exceed 170,000. Firm estimates are difficult to make, since they are an elusive and shy people, and their forest homes are often virtually impregnable to the full-sized Negro and white man (194;3;178).

The African Pygmy is the smallest of all dwarf human populations, ranging in height from 144 cm (4 ft. 8½ in.) for men and 137 cm (4 ft. 6 in.) for women, to 155 cm (5 ft. 1 in.) for the male adults of some western and southern tribes. Undoubtedly their small stature suits their environment. They can move quickly through the dense undergrowth of the tropical rain forests, slipping through the network of hanging lianas, running lightly along fallen or low-lying branches, and climbing easily into the trees after birds' nests, fruits, honeycombs, and small monkeys, which constitute their main diet.

The Pygmies are, from all accounts, a gentle people, who have survived the incursion of Negro agriculturalists into the marginal forest land by forming symbiotic relationships with them. In return for iron tools, pottery, and bananas, they give the Negroes meat and serve them as lookouts against the approach of potential enemies, animal and human. They occasionally visit Negro villages, learn the settlers' languages, and send their sons to Negro puberty schools. Some Pygmy women become plural wives in Negro households and bear half-Pygmy children. But the gene flow is not reversed; Negro women will not accompany Pygmy men into the forests, and they would have some difficulty in surviving its rigours if they did.

Dwarfed peoples occur outside Africa. Australoid-based types are to be found among the Andaman Islanders of the Bay of Bengal, the Semang of the Malay Peninsula and East Sumatra, and the Negritos who are scattered through the Philippine Islands. Their joint or several origins, and their taxonomic status, have been much discussed. Unless one were to believe that mankind evolved originally as a miniature human being and then grew larger, it must be presumed that dwarfing was a secondary development to suit certain ecological conditions and that it has been maintained through the processes of natural selection. What is more disputed is whether these dwarfed humans represent a single subspecies which spread out from their original African home to Southeast Asia and Oceania, or whether the dwarfing process took place independently among local populations in response to local environmental pressures. The latter proposition is more generally accepted, both on comparative biological grounds and due to the lack of any evidence for early and extensive migrations of the little people.

Dwarfing is common enough in plants and animals, as gardeners and animal breeders are well aware. Among mammals in the wild, dwarf varieties of deer, mammoth, elephant, hippopotamus, and fox have been recorded, while among primates specifically, pygmy bush-babies (lorises), marmosets, and chimpanzees are well known. These dwarfed animals inhabit islands or small enclaves of tropical forests, and, where they do not have to compete with full-sized varieties of their own kind, they can prosper and benefit from their reduced stature and limited food requirements.

As far as the African Pygmy is concerned, his reduced height and weight have given him thermal advantages in the windless, humid heat of the equatorial forest. The Nilotic Negro has adapted to his climate differently; his lean and lanky form presents a maximum of skin surface to the occasional cooling breeze of the open country. The Pygmy in his airless hothouse, maintains his thermal equilibrium by a reduction in body size.

It appears that dwarfism in animals is controlled by genes that deprive the pituitary of certain cells and cause a deficiency in growth hormone (77;364;30). Presumably the high frequency of the condition among the Pygmy populations owes much to the degree of inbreeding necessitated by the exigencies of life in the forest (177:1320–22;178). Hunting bands are limited by the availability of food in any one area, and the groups of families are rarely in communication with one another.

Except for local variations in height and weight, Pygmies are alike in having relatively short legs, especially in the thigh, and long arms, particularly in the forearm. Even more than the Negro they have a pronounced lordosis, or incurving of the spine. The peculiar formation of the tops of the thigh and leg bones allows even greater mobility at the joints than the Negro enjoys, and the arrangement is particularly adapted to habitual squatting (341;298).

It has been suggested that part of this flexibility at the joints has to do with a reduction of bony crests throughout the skeleton, consequent upon an excess of female sex hormone, which in the male tends to give rise to *gynecomasty*, or overdevelopment of the breasts (3).

The Pygmy head seems large in proportion to the small body. It is usually mesocephalic, or submesocephalic, with quoted indices of between 75 and 79; high-vaulted; and rather infantlike in its oval to globular shape. The nose is very depressed at the root and low bridged; it is very broad, with the wings of the nostrils (*alae*) both broad and high, and it has an overhanging tip. Most Pygmies have long, convex upper lips with little eversion. The upper jaw is prognathous, and the lower is marked by a retreating chin.

Skin colour is generally lighter than that of the Negroes, varying from reddish yellow, or yellow with brown overtones, to mahogany. Eyes are brown; head hair is dark rusty brown.

While foetal body hair is characteristic of all human babies, a reminder of a more hirsute stage in our past, it soon disappears, to be replaced at puberty with a more selective distribution. Among Pygmies, however, this foetal hair is retained. At first yellow or reddish in colour, it becomes brown in the adult and, in many males, thickly developed. Both sexes are well endowed with axillary and pubic hair, usually black, and the follicles are richly accompanied by apocrine glands. Negroes are said to find the smell of a Pygmy offensive, which may indicate that its original purpose was as an isolating mechanism to preserve the genetic integrity of the subrace. On the other hand, it may have had a more primary purpose in offering protection against insects (101:108). Some other defence against the malarial mosquito is offered the Pygmy by sickling in his blood cells, a trait he shares with the Negro, who may, indeed, have inherited it from him originally.

CAPOIDS

The Capoids are another dwarfed race. They derive their name from the Cape of Good Hope, where the Dutch settlers encountered some of their kind and called them *Strandloopers*, 'Beachcombers,' since they had adapted themselves to life on the seashore. In fact, these people seem to have been a somewhat mixed breed, rather taller than the true Capoid whose typical representative is the Bushman of the marginal areas of South and West Africa. They are a much diminished race whose anthropological interest lies in several curious morphological features, of which their small stature is but one. Indeed, the Capoids were once probably full-sized human beings and far more numerous than their present total of about 53,000 would indicate.

At some stage in the distant past, the Bushmen moved into the rich and fertile territory of the Cape Province, where they hunted abundant game and found a good variety of vegetable roots to satisfy their needs (370). It is possible they evolved there, as some believe, but it is more likely that they migrated from the north (100:636). In any case, their troubles seem to have begun in the seventeenth century with the arrival of another mixed race of Capoids, the Hottentots, who brought with them not only some Congoid genes but also the practice of cattle breeding. The Bushmen hunters added Hottentot cattle to their natural prey, and in the inevitable conflict that ensued, the displacement of the endemic population began.

Subsequently, Bantu expansions about the end of the eighteenth century added to the unequal pressures upon the diminutive Bushmen from the north and east. Finally, Dutch and British invaders squeezed them from the south into their present inhospitable habitats, mainly the northeastern part of South-West Africa (Namibia), neighbouring regions of southern Angola, and the northern and central parts of the Kalahari Desert. There, at least, they have managed to preserve their homogeneity, whereas the Hottentots' cattle breeding put them into direct competition with the Boer farmer, and absorption and annihilation have combined to reduce their numbers below even those of the Bushmen (391;370;324;276;346;376).

Why the Bushman should have become dwarfed is not known. Males are commonly only 140 to 144 cm in height (4 ft. 7 in. to 4 ft. 9 in.) and females an inch or so smaller. In the northern part of their habitat the people are somewhat taller. In Angola, most are said to reach about 152 to 159 cm (5 ft. to 5 ft. 2½ in.). But unlike the Pygmy in his steaming forest, needing to negotiate tangled undergrowth, the Bushman has to cross wide areas of open country, exposed to sunlight as strong as any experienced in Africa. He must be able to adapt to temperatures that rise to over 100°F. in the sun, while at night he may be subjected to near-freezing conditions. It may be that a small frame assists in the conservation of body liquids and the need on long journeys to economize in food.

While dwarfing may not be the direct result of the Bushman's hunting techniques, his light tread and sharp bursts of speed can help him track and attack his prey. His small, infantile hands and feet and upper arms (157;392;393), which give him the shortest upper extremities of any human taxa (137), only permit him the use of a light bow. The archer must rely upon poisoned arrows, which penetrate the skin of his quarry and eventually render it helpless for the final kill (64;374). But the tracking of the wounded beast to its collapse might take hours or even days, and then endurance and adequate climatic conditioning is of more importance than size or brute strength (378).

For the cold, the Bushman must rely upon the skins of his prey, for he lacks body hair. His own lightly coloured, smooth skin and bare neck do, however, facilitate heat loss in high temperatures. His head finds some protection from the sun through its short, tightly coiled 'peppercorn' hair form, which leaves patches of skin visible between the tufts. Individual hairs are fine and narrowly elliptical in transverse section, and they emerge obliquely from curved hair follicles, twisting of their own accord (168;405).

The Bushman's eyes are protected from the glare of the sun by slitted eyelids. The upper lid is thickly distended with fat, so that there is scarcely any infolding below the eyebrow. It is sometimes compared with the Mongoloid eye fold, but in fact the skin structures are quite different, and instead of the characteristic 'slant eyes' of the Mongoloid, the Capoid's eyelids are almost straight, parallel, and close together, leaving only a narrow slit for the bright light to penetrate (6).

If, then, the Bushman is to some extent adapted to his desert existence, he displays a number of features that are less readily explicable and which distinguish him from other taxa. In many cases, these seem to be paedomorphous, or infantile. As we have previously remarked, the human species as a whole owes much of its character to its arrested foetal development, which has allowed us a wide range of adaptability (see Chapter Two). Some races are more paedomorphous than others, and the Capoids are generally recognized as exhibiting the largest number of such infantile features.

Apart from his diminutive stature, we have already noted the Capoid's small hands and feet and his lack of body hair. His skull is also remarkably infantile, not least in its lack of distinction between the sexes; where the rest of the skeleton is missing, it is often difficult to determine the sex of a specimen (136). Cranial capacity is generally low, but not taken in relation to overall body size; the Australoid has the same capacity, only in a full-sized body.

The Bushman's rather bulbous forehead is wide, and the sides of the skull project widely—another infantilism (392;357). At about 74 to 76, the cranial index puts the head into the dolichomesocranial range. The face is broadened out by widely projecting cheekbones, but their sharp return towards the nose makes for a very flat face, accentuated by a low nasal bridge. In fact, with its flattish tip, the nose appears to have been mechanically squashed into the face, and widened in the process, to make its proportions almost unique among the human taxa.

The Capoid nose may, again, be an infantilism, for certainly it is difficult to ascribe its extreme breadth to climatic adaptation. The dry air the Bushmen breathe in their present habitats elsewhere favours the kind of long, beaky nose of the American Indian or the Tibetan among Mongoloids, or the desert Arab among Caucasoids; short, wide noses are usually associated with the hot, humid conditions typical of tropical rain forests (51). The organ's function is primarily to moisten the air to the 95% humidity level required by the lungs for proper functioning (272;375;311;312;403), and to warm the air in cold climates. Clearly, the comparatively recent move of the Bushmen to the desert has not yet had time to change their inherited nasal structure, which must have been otherwise determined. The Eskimo has compensated for his low-bridged nose, seemingly unsuited to the cold Arctic air to which he, too, is a comparative newcomer, by internally developing long, narrow, nasal passages to serve the same warming and humidifying purposes (51).

The lower face of the Capoid projects hardly at all, and this orthognathism is again counted a paedomorphous feature. Similarly, the facial features from the mouth to the root of the nose are compressed into a restricted space when compared with the breadth across the cheekbones. The lower jaw is slender but wide at its points of articulation with the rest of the skull. The lips are not much thicker than those of Caucasoids and are not everted like the Negro's, but both upper and lower lips are pushed forward in a perpetual pout, which tends to give observers the mistaken impression that the face is prognathous.

Capoid ears have come in for some comment, since they seem to be unique in their external form. They are generally small, squared on top, and lobeless, and the lower extremity extends forward to merge with the cheek, making it seem that the ear is attached obliquely to the head (270;393;324).

The Bushman's skin has a tendency to deep wrinkling, in maturity as well as old age. Around the abdomen this might be attributed to the periodic gorging of a hunter following a successful kill, the skin then hanging loose in times of dearth. But the wrinkling and folding appears in the skin of consistently well nourished people, and it affects the face as well as other parts of the body. It apparently has a more radical cause in a generally poor development of the fatty layer of the dermis (324). Apocrine glands seem sparsely distributed in the Capoid skin, since the Bushmen are said to lack the strong body odours of the Pygmy and Negro.

Forward lumbar curvature (lordosis) is greatly exaggerated in both sexes of Capoids and is due to the wedge shape of the vertebral discs (383). It causes the long and narrow sacrum (324) to project almost horizontally and thus to tilt the pelvis and push out the lower part of the abdomen. This lordosis may also have something to do with that most striking feature of the female Capoid, the enormous size and strange form of her buttocks. (390) Large, projecting, and well-rounded 'cheeks' are a feature of women's posteriors in many races, but few demonstrate the almost horizontal projection of the Capoid woman's behind, often accompanied by grossly enlarged upper thighs (Fig. 23A, B). The purpose of this *steatopygia*, as it is called, is uncertain. Internally, the buttocks are formed from masses of fat incorporated between crisscrossed sheets of connective tissue (111;391), but it seems unlikely that they serve as stores of nutriment in times of shortage, like the humps on camels and zebus and the tail of the fat-tailed sheep. Not all Capoid subraces have been forced into the stringent conditions of desert life, and before the Bushmen were expelled from their more favoured territories, there was never any shortage of game and root crops to serve their needs. In any case, even emaciated women do not appear to derive benefit from the fat deposited in their buttocks, and males have little or no steatopygia.

Quite as puzzling is the extraordinary development of the Capoid woman's genitalia, which has intrigued and fascinated European travellers since their first acquaintance with the Hottentots of the Cape Province. James Cook, on returning from his first circumnavigation of the world, called at Cape Town in 1771 and took the opportunity of investigating 'the great question among natural historians, whether the women of this country have or have not that fleshy flap or apron which has been called the *Sinus pudoris.*' In fact, this 'fold of shame' is an extrusion of the inner lips (labia minora) of the vulva, with an elongation of the prepuce of the clitoris (110;111;20:313). In one form, termed the 'butterfly type', each labium is flattened and broadened to form a winglike object, and measures in length 3.8 to 6.3 cm (1½ to 2½ in.), with a maximum reported of 9 cm (3½ in.) (390). Another form has the appearance of a turkey-cock's wattle, where the width of the extrusion is reduced and the front part is thickened, to a total length of 7½ to 10 cm (3 to 4 in.) (138). This second, elongated type, when pendant and undivided, must have seemed to many of those early observers like a flaccid penis, but closer examination when the woman was on her back and the 'wattle' spread out, would have shown clearly that the protruding lips surrounded the vaginal orifice in the usual way (Fig 23C, D) (20:315).

Again, the purpose of this genital elaboration is uncertain, but, like the steatopygia and the swollen areola around the pubertal nipples, it must have some erotic value that has ensured its genetic persistence. There seems little doubt that the labia minora are not artificially elongated, as some have supposed; they are already enlarged and protrude from the vulva of young girls and increase in size at puberty (324;390). It is reported that in former times, Bushwomen deliberately exposed their genitalia to their partners in erotic dances (138), and comically elongated labia are a feature

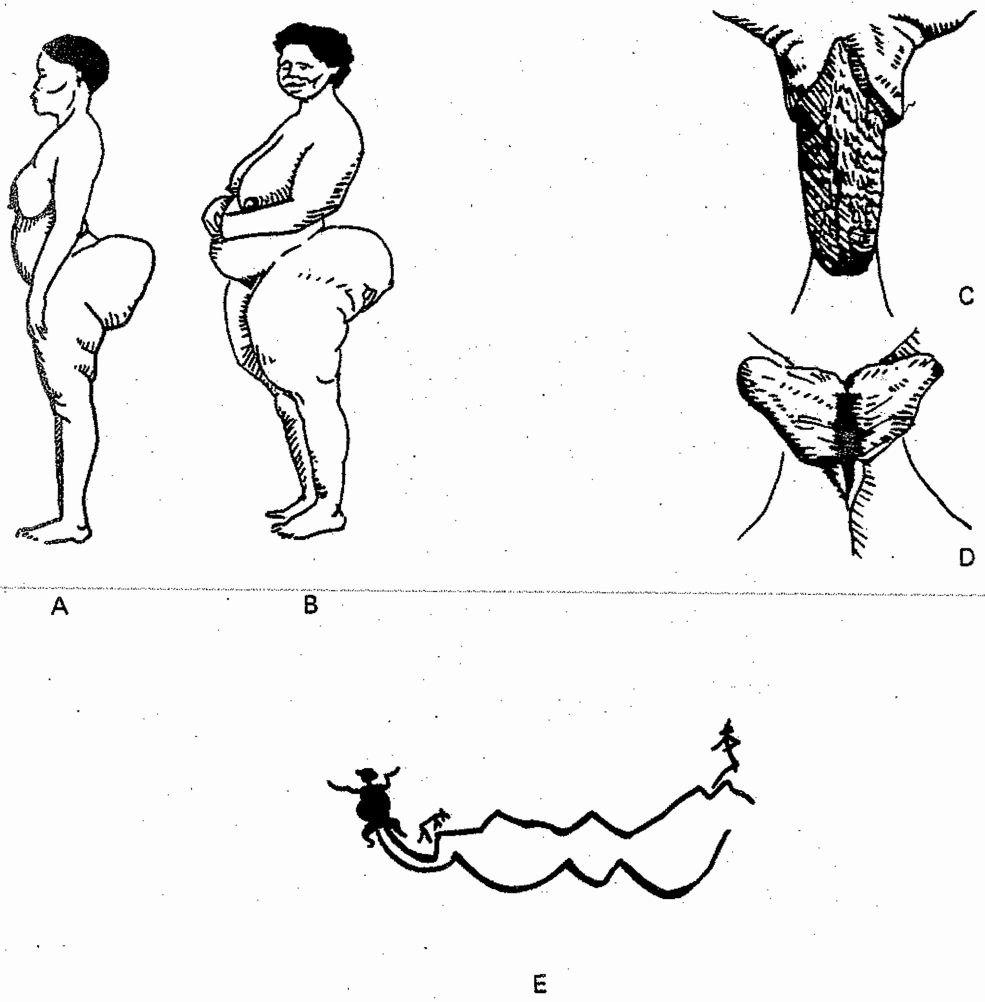


Figure 23. Capoid female anatomy. A and B. Two examples of steatopygia. C and D. The extruded labia minora of the vulva, of the 'wattle' type; (C) pendant, (D) divided. (After Baker, *Race,* 1970, p. 315, Fig. 56.) E. From a Capoid rock painting showing exaggerated genitalia of a Bushwoman. (After photograph from R. Summers [Ed.] *Prehistoric rock art . . . ,* 1959, reprod Baker, *Race,* 1970, p. 311, Fig. 55C.)

of many examples of Bushman rock drawings (Fig. 23E) (20:311).

Less striking, perhaps, and more explicable, is the paedomorphous character of the male Capoid genitalia. Very often the penis, even when unstimulated, maintains an almost horizontal position like a young boy's, instead of hanging down in the usual flaccid state (20:311). No less infantile is the contraction of the scrotum, so that it is drawn up close to the root of the penis as if only one testicle has descended, and that only incompletely (193).

Africa, then, has produced a puzzling sequence of hominids and men. From the most ancient levels of pre-*sapiens* habitation, archaeologists have recovered remains of our australopithecine ancestors and their crude artifacts. Although their evolutionary successors, *Homo erectus* and *Homo sapiens*, do not go unrepresented on African soil, the cultural initiative seems to have passed elsewhere during the last half of the Ice Age, and the great advances were made in Asia and Europe. Nevertheless, it seems at least possible that North Africa served as a migratory route for the passage of Neanderthal man and his entry into southern Europe.

Traces of a characteristically neanderthaloid culture have come to light in northern China, and this, combined with certain features of the Neanderthal skeleton reminiscent of Peking man, has made some anthropologists think that this early European owed some of his genetic heritage to Far Eastern influences (68;100:461,521f.). Furthermore, he seems also to share some features with the African Bushman, whose origins have been traced to the north of the continent (271). It may be significant that the Last (Riss-Würm) Interglacial fossils of Italy are the first to show Neanderthal features (353;354), pointing to a possible entry into southern Europe across the Mediterranean (100:576).

It is an interesting thought, then, that present-day European Caucasoids could well owe some part of their genetic constitution to both Mongoloid and Capoid influences, and that in the Congoid race there may be a mixture of genes from three other major taxa. However, all these genetic infusions and transfusions took place tens of thousands of years ago, and subsequent regional separation and proliferation within racial boundaries have accentuated differences and restricted further miscegenation. In our concluding chapter, we shall look further at the subject of race mixing in modern societies.

Chapter Ten

MIXING THE GENES AND CULTURES

> If we cannot end our differences, at least we
> can help make the world safe for diversity.
>
> JOHN F. KENNEDY
> Commencement Address, 1963
> The American University, Washington, D.C.

The foregoing chapters have dealt at some length with the problem of racial origins and the present extent of man's diversification, geographical and physical. We have seen how the human animal has evolved from Miocene ape-men, through Pleistocene hominids, to his present status of *Homo sapiens*. Cultural advances allowed the pithecanthropine hunter to track his prey into the marginal areas of Asia, and agriculture offered his successor the chance of forsaking the hazardous trail of migratory herds and settling in more leisured surroundings to develop his powers of thought and self-expression. Increasingly, the painfully slow processes of evolutionary advance, through stimulus and response, were supplemented by man's cultural adaptation of himself and his surroundings to serve his more immediate needs. No longer confined to those ecological niches to which they had become adapted, the more advanced populations could extend the range of their accustomed habitats to face new challenges and exploit more of the world's resources.

As long as men were limited by their physical and mental conditioning to remain within their frontiers, they could achieve a balance between their numbers and available resources without undue disturbance to other creatures or neighbouring communities of their own species. But technological advancement and expanding numbers threatened to breach population frontiers and with them those cultural and genetic isolating barriers that had hitherto separated breeding units and allowed them to develop

at their own pace and in accordance with local needs.

The result has been the establishment of areas of genetic mixture, called *clinal zones*. These are frontiers in depth, within which a subspecies gradates with another through intermediate forms. The chain of related features, replacing one another progressively, is called a *cline*. (228;362:178) For example, living Europeans can be graded in respect of eye colour from a high frequency of blue in the northwest, particularly in Ireland and Scandinavia, to a high frequency of brown in the southeast. That gradient is the eye colour cline. In zones between major racial groups, whole complexes of related clines are to be found. For example, in central Asia, north of the Himalayas, Caucasoids merge gradually over a wide area into Mongoloids through several Turkic-speaking groups like the Kirgiz, Uzbeks, and Turkomans. On the other hand, the southern face of the Himalayas, following the southern part of Movius's Great Racial Divide, presents a much steeper, and thus geographically narrower, clinal zone in northern India, Nepal, Sikkim, Bhutan, and the North East Frontier Agency (100:18).

Some interracial clines are of comparatively recent origin. The Congoid(Negro)-Caucasoid cline in Africa is no more than 10,000 years old, as is the Mongoloid-Australoid cline in Southeast Asia, Indonesia, and the Polynesians and Micronesians of the Pacific Islands (101:8). These differ from subracial clines, such as those we have noticed among European Caucasoids—Nordics, Alpines, and Mediterraneans—in that they involve more genetic variables. They also tend to leave telltale pockets of ancient peoples in refuge areas, like the dwarfed populations of Australoids in the Philippines, the Malay Peninsula, the Lesser Sunda Islands of Indonesia, the Andaman Islands, and parts of India. These groups have been left in the wake of the Mongoloid migrations that followed the period of the European Pleistocene. Nearer our time has been the establishment of a clinal population of mestizos in Latin America, where the Caucasoid Spanish conquerors mixed their genes with local Mongoloid Indians.

Racial mixture, or enlarging a population's gene pool by the introduction of fresh blood from outside the usual breeding frontiers, has several obvious biological advantages. The more varied the genotypes available for mating, the less likelihood there is of homozygous combinations of recessive genes, with their possible deleterious effect on the progeny. The most extreme cases of inbreeding occur in small, geographically limited communities, such as the inhabitants of islands, or in those self-restrictive, culturally determined groups like religious societies, class or craft organizations, or ruling families. The offspring of such unions tend to be less vigorous and are likely to exhibit physical and mental abnormalities. Clearly, the larger the scope for outbreeding, the more possible it is for a community to achieve a genetic equilibrium that, while assuring a generally healthy breeding stock, also manages to retain in its gene pool a useful store of recessive genes. Even though these, in the absence of homozygous matings, will normally play no part in determining the population's phenotype, they contribute to the genetic reserve. Should climatic or ecological circumstances change to make their traits advantageous to health or survival, the natural processes of selection will allow them to manifest themselves and affect the genotype of future generations (132;297).

This really has been the key to man's biological success; his polymorphism has given him the ability to adjust to environmental changes and to exploit a variety of habitats (361:78). Racial diversity is the direct opposite of 'putting all one's eggs into one basket.' The differences between groups have enabled the human species to evolve at a faster rate than most animals and to proliferate throughout the world without dividing up into new species. Racial differentiation is reversible, since hybridization may allow races to merge into a single, virile population; speciation, when racial barriers become so absolute that all gene flow is prevented, is irreversible, since, by definition, species do not normally interbreed.

On the other hand, mixing races is rarely a standardizing process; the features of each population do not appear in equal proportions in the hybrid progeny to produce the best of both worlds. The newly introduced genes, however superior their effect on character and physique, are not necessarily those that will dominate the hybrid. More compelling are the heritable features that will allow the individual to meet the demands of his new environment and survive. So, almost inevitably, the longer-established

population of any region will be the one contributing most significantly to the mixed genotype, and history abounds with examples of an invading race succumbing in due time to absorption by the subject people. Caucasoid Kashmiri traders have for centuries been crossing the Himalayas to settle in Tibetan cities and there beget children of local women, but, like the Spanish invaders of the Andean *altiplano*, they have not changed the essentially Mongoloid character of the local inhabitants, and for a very good reason. Only the Mongoloid has adapted his heart and lung capacity and red corpuscle ratio to deal with the thin air of those high altitudes, so that only his and the llama's females can carry their young in the womb to full term (288;289;314;165;207;213).

Nature, then, is no eugenist. Race mixture does not automatically raise the level of physical and mental attainment in the resultant hybrid population, nor does it make the progeny necessarily more vigorous. It can help avoid the dangers of breeding within too restricted a circle of choice and as we have seen, can reduce the likelihood of homozygous combinations of recessive genes. It has also played an important part in man's evolution by allowing him to adapt to a wide range of different environments. On the other hand, cultural progress has to a large extent lessened the importance of both of these considerations. Greater facilities for travel within large racial territories have promoted sufficient gene flow to maintain the genetic variability of most communities without the need to seek fresh blood from more distantly related populations. There are, of course, small, highly specialized groups in danger of extinction, like the Amazonian Indians, and even whole subspecies like the Australoids and Capoids have an uncertain future; but there the problems have arisen mainly through the depredation of their homelands by more advanced competitors, and mass deportation and integration would be more likely to obliterate their racial distinctiveness than to ensure its survival. There is no reason to doubt that, left to themselves, they could continue to maintain an ecological and genetic balance in what is left of their native habitats, without the infusion of fresh genes from alien sources.

Again, it is man's cultural prowess that is more likely to extend his exploitation of the resources of this and other planets, rather than any further physiological adaptation through the uncertain processes of natural selection. He has the ability to provide for his needs over prolonged periods in virtually every part of the world, and even in space, without having to wait for nature and miscegenation to change the colour of his skin, his basal metabolism, his endocrinal system, the constituents of his blood and its distribution, the size of his heart, lungs, nose, and teeth, his hair form, the number of his sweat glands, and so on. Some adaptive arrangements he can make at will with drugs or cosmetics, and the rest he can dispense with by creating his own environment wherever he chooses to live and work.

If racial mixing is no longer so necessary to the continued viability of the human species, there are, on the other hand, some aspects of miscegenation that can be positively disadvantageous. These largely spring from the nature of man himself. He is not just a biological organism; considerations other than mere physical survival determine his well-being. He is a cultural animal, and his social relationships can be as important to his physical and psychological health as his environmental conditioning. This is particularly true of those more advanced societies which have largely overcome the basic problems of existence and where man has learned to demand more of life than a full belly and shelter from the elements.

Cultures can demand as much adaptation of mind and body as ecological pressures, and the conditioning of individuals to the institutions of their tribal society begins in the womb. What a pregnant woman eats, drinks, and breathes, her manner of life and work, and her preparations for parturition, or lack of them, all affect the growing foetus. After birth, the baby's first months and years—even, we are told, those vital moments in the midwife's hands—can profoundly influence its future life, and most of these activities will be culturally determined. Later, the climactic episodes in the individual's development—puberty, the onset of menstruation, sexual maturity, and menopause—all are given a distinctive cultural definition by which the tribal group can recognize its own and preserve its ethnic identity. Such self-perpetuating isolating barriers can be more effective than natural deterrents like body odours to miscegenation, for they operate through the emotions.

To the would-be reformer and harmonizer of social discord, these cultural differences are the prime barriers to racial integration, and it is for many well-meaning people an article of faith that their divisive effect can be minimized, first by a physical juxtaposition of racial groups in the same territory, and second by the encouragement of interracial marriages. Thus, through community relations and communication, followed, it is hoped, by the dilution of racial characteristics through gene flow, social harmony will prevail and all will recognize an identity of communal interests.

Alas, there is little evidence so far to suggest that social juxtaposition has any more unifying effect than miscegenation. Usually, the longer-adapted population will tend to dominate the newcomers, culturally as well as genetically, and the hybrid will not necessarily inherit the best of either culture, any more than he will inevitably be heir to the most desirable genes from the parent racial stocks. Too often, indeed, the progeny of mixed unions have found themselves in a cultural and social limbo, disowned and despised from both sides. That has been the unenviable fate of many hybrid populations throughout the world where races, and even subraces, have interbred.

Where a more virile and culturally advanced race moves into an undeveloped territory as a minority group and steadfastly maintains its own standards of racial distinctiveness, a no less abrasive situation is almost bound to arise. Even though a strictly enforced endogamous tradition is maintained by the immigrants, so that no hybrid group emerges, the juxtaposition of the two contrasting cultures can itself be a cause of friction. If the newcomers then proceed to multiply faster than the rest of the population, dominating the local scene numerically as well as economically, social discord is inevitable, and no amount of belated immigration or land tenure legislation is likely to relieve the situation.

Such has been the case in the islands of Fiji during this century. In 1874, the native Fijian population, a Mongoloid-Australoid racial mixture of Polynesian and Melanesian stock, numbered about 200,000. Epidemics had reduced the indigenous inhabitants to some 83,000 by 1919, but by then they had been joined by 40,000

Caucasoid Indian immigrants. By 1945, these had outnumbered the native Fijians, despite the fact that the colonial authority had barred further immigration from that source as long ago as 1916. However, by 1966, a higher fertility rate, lower mortality, and earlier childbearing among Indian women, helped widen that population margin by no less than 19 percent. It was to avoid creating that kind of virtually uncontrollable minority problem that the Australian legislators formulated their 'white Australia' policy, with eyes directed more towards China than Asia (231;161).

On the other hand, where an equally virile but differently cultured ethnic group moves into an already developed territory as a minority population, and steadfastly maintains its own standards and distinctiveness, an even more abrasive situation can arise. Again, the immediate problem is not in the appearance of a hybrid population, since the cultural inhibitions of the newcomers will discourage miscegenation, but in the conflict of cultures.

The social worker tends to concentrate public attention upon the wider issues affecting racial integration, and to press for legislation forbidding discrimination in such matters as club membership, public appointments, education, employment, and so on. Again, the assumption is that obligatory social juxtaposition will ultimately bring understanding and mutual tolerance. But the acceptance of strangers into a long-established community is far more likely to be hindered by apparently trivial considerations like the smell of highly spiced, exotic foods in the communal areas of municipal flats, or garlic-laden breath in a crowded bus, or the insistence of racial minorities on their children defying school dress regulations by wearing traditional costume. Such seemingly minor irritants are not readily susceptible to legislation, and it would be counterproductive in racial harmony if they were. But to an insular people unused to foreign ways, faced with a sudden proliferation of strangers in their midst, taking over large areas in city centres for their dwellings, shops, banks, and places of worship, filling the schools with their children and the hospitals with their sick, any further, niggling reminder that local facilities have now to be shared with aliens can be far more provocative than the occasions themselves would seem to warrant.

Furthermore, as attitudes harden and anti-racist legislation proliferates, it becomes increasingly difficult even to discuss publicly such matters of contention without being accused of racial prejudice and mischief making. So the sores of discontent continue to fester under the dressings of officially directed 'tolerance.' Then comes a downturn in the economy, which puts employment opportunities at a premium, and accusations of job stealing are, probably unjustly, levelled at the unhappy immigrants. It needs only the publication of statistics, genuine or contrived, to demonstrate that the newcomers are proliferating faster than the rest of the population for the suppressed indignation to explode in race riots.

Happily, experience in such ethnically mixed communities as exist in some of the larger cities of North and South America has shown that even the most disparate peoples can live side by side in comparative harmony. But in most cases this will be where indigenous cultures have not themselves been so long established, and where the traditional ethos of the country has been freely to admit peoples ousted by fear or want from their own homelands.

Ethnic juxtaposing is not so easily accomplished in countries like Great Britain, whose insularity over centuries has seemed to the rest of the world at best a joke, at worst positively xenophobic. To open British frontiers suddenly to an invasion of hundreds of thousands of immigrants, racially and culturally far removed from the experience of the native population, as happened after World War II, must now seem in retrospect to have been an act of political madness, however well intentioned. Unfortunately, long before the best efforts of social workers and race-relations boards to reverse traditional attitudes could be effective, economic reversals exacerbated the situation and hardened resistance to integration in those parts of the country most affected by immigrant settlement.

Nevertheless, short of any wild scheme for the mass deportation of the newcomers and their families, which would be socially immoral and economically not feasible, Britain and other nations faced with similar problems have to find means for resolving them quickly before the social fabric is torn apart with racial strife. To many deeply concerned citizens, the saddest and most frustrating part of the affair is that increasingly the very mention of 'race' (or any of its euphemistic substitutions) has become so emotive that one hardly dare raise the subject of ethnic differences without calling forth a torrent of abuse and accusations of illiberal attitudes. In such circumstances, calm, rational discussion on the distinguishing characteristics of the human taxa, physical, cultural, and intellectual, which must be the basis for any solution to the race problem in mixed communities, becomes almost impossible.

Despite efforts to eliminate the issue, racial differences do exist, and they are usually of very long standing. Much as sociologists and some scientists have of late striven to minimize those differences, and even to deny the validity of the race concept to the human species, no intelligent observer can fail to appreciate those physiological details that distinguish one taxon from another. No one could mistake a full-blooded Mongoloid for a Congoid, even if the latter were an albino, nor could a Caucasoid, of whatever subrace, be easily taken for a member of either of these taxa, or for an unmixed Australian aborigine. Certainly there are difficulties in assigning racial categories to members of clinal populations, but that is no valid reason for denying the validity of the major taxonomic divisions of mankind.

Again, some authorities claim that there has been so much gene flow throughout the human species that it is no longer possible to identify sufficient distinctive criteria in geographically discrete populations to warrant their classification as races in the biological sense. However, a race is not categorized on the basis of just a few unique traits, but upon a whole range of characteristics which that taxon possesses and which, *taken together*, distinguish its members from those of every other taxon in the species.

It is also fashionable to assert that racial differences are of no great significance in social terms since most, if not all, are simply the result of adaptation to the climatic and other conditions existing in their original areas of development. Since mankind is originally of a single stock, such adaptive changes should not obstruct any renewed integration of geographically diverse populations. However, even if major racial differences were all so derived—and many seem quite unrelated to any identifiable environmental pressure—the monogenetic theory of man's origin from a single stock of *Homo sapiens* is not without its critics, as we have seen.

Moreover, the physiological differences between the various subspecies should not be underestimated, however they were occasioned, and must affect the attitudes of mind of the individuals concerned as well as their physical capabilities. They involve far more fundamental considerations than outward appearance, colour, shape, limb proportions, and so on, and extend to such sensitive control areas as the neuroendocrinal systems, which determine almost every aspect of a person's behaviour. To this extent the physiological characteristics of a race determine its culture, and this, as we have seen, is of greater importance in race relations than differences in external features.

Perhaps the most absurd exercise in international self-deception over racial differences is the Olympic Games, held every four years, in order, it is said, to promote harmony between the diverse peoples of mankind. Nations, once they can be politically defined and officially recognized, may send representatives to compete against one another in a wide variety of athletic events on a supposedly equal footing. However, it is quite obvious that since inherited physical characteristics must largely determine the ability of any individual to compete in a particular event, there has to be some measure of racial discrimination in the availability of honours. No full-blooded Japanese, a Mongoloid subrace, is ever likely to compete effectively in a sprint against a Negro, since the latter's limb-to-body proportions fit him so much better for fast running over short distances. For the same reason, no Japanese man or woman has ever won a medal for the high jump, nor is a Pygmy Congoid, a Bushman Capoid, or a Negrito Australoid ever likely to be selected to play in an international basketball team.

A boxer with unobtrusive zygomatic arches will fare better in the ring than one whose cheekbones project widely on either side of his face, since the skin covering them will be more liable to abrasions, and the resultant flow of blood could obscure his vision. A Nordic Caucasoid might then be expected to be less vulnerable in a fight than a Mongoloid. A thick, heavily boned skull is also an asset in the pugilistic profession, since it can better absorb jarring blows to the head and offer more protection to the brain. The average Negro is well equipped here, as is the Australian aborigine with his massive braincase and skullbones, matching even those of his hominid predecessor, Java man. On the other hand, the Australoid's projecting brow ridges might prove a troublesome source of bleeding above the eye.

With every Games producing a new crop of world records, the margins between successive optimum performances must become ever more slender, and the natural advantages enjoyed by the various races in those events for which they are physiologically suited will become increasingly significant, no matter how much specialized training be given the other contestants beforehand.

If the idea of equal chances in an interracial athletics competition appears slightly ridiculous, surely the height of absurdity was reached in 1968 when the organizers set the scene for the Games in Mexico City, 1½ miles or so above sea level! The rarified air at such an altitude put all competitors at a disadvantage save those normally living at such a height, or those fortunate teams whose sponsors could afford to send them for training at an equivalent altitude for months beforehand. Even then, few athletes could have had time to adapt their bodies to endure the additional stresses imposed by the atmospheric conditions, when it be considered that nature has taken tens of thousands of years to accustom human beings to live normal lives in such places as Tibet and the Andean *altiplano*.

The Olympic Games may be something of an absurdity, but they are, in any case, becoming too expensive and politically disruptive to be worthwhile. Much more serious is the economic rivalry between races. The overproliferation of the human species and the polarization of access to the world's riches have brought about a dangerous confrontation of world powers. At first sight, the major contestants might seem to be aligned behind ideological frontiers, the 'free world' of capitalism or mixed economies versus the socialist bloc and its satellites. But wars are seldom waged only to establish the claims of rival philosophies; these may provide the banners beneath which to rally the emotions of men and commit them to the ultimate folly of self-destruction, but history can usually discern some more deeply seated, materialistic causes of international discord, such as land hunger, or failing resources and fear of further deprivation. Furthermore, antagonism between peoples can be more easily evoked when they are of different races or subraces, with clearly marked physical characteristics and heir to cultural traditions that can be made to seem to the other side as uncouth, barbaric, and threatening.

If one were to seek a racial grouping in the present disposition of major powers, the United States and her European allies could be reckoned predominantly Caucasoid, but the U.S.S.R. and its satellites present a curious consortium of the three major races, Caucasoid, Mongoloid, and Congoid, if one can count the emergent African states as coming at least temporarily within the socialist sphere of influence. But any long-term view of global politics must seriously doubt the stability of the Soviet empire, if only because imperialism has already outrun its practicability in the latter part of the twentieth century. One can reasonably suppose that the stresses that are already clearly evident within the Russian-dominated bloc must before long spring the whole unwieldy structure apart and force a new alignment of the constituent nations. We might then expect a more clearly racial grouping of political forces, for behind that extraordinary Soviet conglomerate there awaits a homogeneous giant ready to attract to itself those Mongoloid peoples that have hitherto owed their uneasy allegiance to Moscow.

Mongoloid populations of the world already number some 1½ billion, or 37 percent of mankind, peopling half the inhabited land area of the planet, largely to the east of Movius's Great Divide. Their heartland is China, where the race probably evolved, and they have retained their racial characteristics with less variability than have the Caucasoids and Congoids. Although they vary less among themselves than any other subspecies of human beings, they differ more from all other taxa than does any other race. This homogeneity may be the result of geographical isolation, but one cannot help wondering if it has not also to do with their possible independent evolution from hominid grade to *sapiens*. Certainly Mongoloid culture, in all its aspects and diversities, is as distinctive as the race's physiology.

It may seem to some Westerners a spine-chilling idea that in the Far East there lurks a mighty, homogeneous monster, which, under a centralized control, is already challenging the rest of the world in population numbers, access to natural resources, advanced technology, and military might. One recalls how easy it was for Western propagandists in World War II to conjure before us the sinister, scarcely human, buck-toothed monster of Japan, so easily imprinted upon the national consciousness by the grotesque imagery of the political cartoonist.

The spectre of the 'yellow peril' has been diminished somewhat by subsequent events, as we drive our Japanese cars along Western highways, listen to Japanese audio and radio equipment, and photograph our loved ones and countryside with Japanese cameras on Japanese film. But the Mongoloid heartland is still for most of us a mystery, despite the take-away Chinese food shops on every street corner and the flourishing Chinese communities in most of our major cities. Unfortunately, it seems to be official Chinese policy to let the mystery remain, and to restrict our knowledge of the country and internal events, even of major earthquakes, to spasmodic reporting of wall posters, or official press releases.

If the Chinese minority groups living in the West have done something to dispel the haunting spectre of the impassive, secretive China, unknowable and vaguely sinister, it can hardly be doubted that any realistic appraisal of global politics must allow for an increasing competition for space and resources between the Mongoloid and Caucasoid worlds. Well before any major confrontation is likely to develop along these lines, we may expect the Soviet power bloc to split open and release its primary racial elements for regrouping, the predominantly Mongoloid clinal areas of the North and East finding a new allegiance with their cousins across the Urals.

Presumably in such matters of global confrontation no earnest peace worker is going to suggest uprooting whole populations and

forcibly resettling them as minority groups in established communities on the other side of the world. We have to seek some more practical method of resolving our interracial difficulties, and any solution must begin with understanding the ethnic situation as it is, rather than as we might wish it to be. In effect, Caucasoids have to appreciate the extent and nature of the differences between themselves and other races, and vice versa, and some attempt could profitably be made by physical anthropologists, geneticists, and behavioural psychologists to relate those differences to cultural traditions.

We shall, perhaps, better understand the Oriental mind if we can associate specific features in the Mongoloid racial type and the environmental factors that have contributed to their formation with, for example, Chinese attitudes to art, religion, family relationships, and political philosophy. Similarly, a clearer appreciation of Congoid racial characteristics might help us better to understand the Negro's genius for rhythmic dancing and music, his adaptability to life and work in places far removed from his tribal homelands, his susceptibility in the past to exploitation by slave traders, native and foreign, and his slowness to create in his own richly endowed continent a distinctive negroid civilization to match those of Europe, Asia, and the New World.

Furthermore, the political divisions within Africa that hinder present attempts to create a pan-African bloc stem in part from racial and subracial differences among the various populations of that continent. These are often insufficiently appreciated in the Caucasoid world, largely through our absurd tendency to group people according to the least significant aspect of their phenotype, the colour of their skins. We speak of 'black Africa' as if it were a homogeneous whole and expect its highly diverse peoples to speak and think alike because they exhibit a similar degree of skin pigmentation. In fact, as we have seen, the populations of the North and East, with their strong Caucasoid affinities, are racially poles apart from the full-blooded True Negroes of the West and Centre. Without a realistic appreciation of the racial and clinal associations of the African peoples, we cannot properly assess that continent's likely part in Third World politics, or the lines along which we may expect to see any future grouping in political allegiances.

A person's temperament is very largely controlled by his biochemistry; Hippocrates's belief in the influence of the body's 'humours' was not altogether wide of the mark. Today we should rather speak of the secretions of the endocrine glands, and these, as we have seen, are racially variable. Perhaps our foreign embassies should include on their staffs an endocrinologist to suggest biopsychological explanations for seemingly irrational actions by local politicians under stress. In any case, the sooner we all appreciate that similar pressures can produce very different reactions in the minds of people of different races, and make due allowance for such variations, the more chance we all have of living in peace on the same planet. We should not then expect everyone to apply identical criteria of judgement to the same political situations. This may have particular relevance when considering the attitudes of authorities towards their own dissident minorities; individual freedom and collective responsibility are concepts capable of very diverse interpretations in different parts of the world. Accusations of illiberalism from across racial frontiers should at least wait upon a considered appreciation of ethnically different attitudes, many of which may be more deeply seated than mere political expedience.

Finally, Utopia is not to be achieved by obliterating racial differences. They have their place in the biological ordering of mankind and in the maintenance of a balanced polymorphism, as we have seen. A universal homogeneity, even if feasible, would remove from the human species not only part of its biological defences but also much of its intellectual vigour and creativeness. We *are* different, because to survive we *have to be* different. Even the most homogeneous of all races, the Mongoloid, exhibits a large number of subracial diversities within its heartland, as well as throughout the clinal populations of the Pacific, Southeast Asia, and the New World. It can hardly be doubted that the tremendous spread of highly diverse Caucasoid populations in the past, from Europe to India, has contributed to the cultural success of that race, and its prime position, numerically and technologically, among the subspecies of man. That racial differences have their dangers needs no underlining these days, but they can neither be overcome nor avoided by encouraging the juxtaposition or miscegenation of racially distinct peoples. To urge either is to misunderstand the origin and purpose of racial diversification and to underrate its contribution to the rich fabric of humanity.

Appendix

NEANDERTHAL MAN AND HIS SUCCESSORS

For the Victorians it must have seemed appropriate that the skull cap found near Düsseldorf, Germany, in 1856, should have acquired the name *Neanderthal,* 'New-man,' from the valley in which the fossil was unearthed. It was certainly 'new' to a world that had yet to be introduced by Charles Darwin to the idea that the human species evolved from more primitive forms of life. That this reputedly fearsome-looking creature, with its flat-vaulted head and heavy brow ridges, could have been an extinct kind of man was not only incredible but savoured of blasphemy. Any explanation for its 'deformities,' racial, social, or pathological, was preferable to believing that mankind could owe any part of its heritage to such an uncouth monster. It was a matter of some embarrassment that, in terms of cranial capacity, it seemed to possess a brain as large or larger than that of modern man.

Admittedly, the amount of information that could be gleaned from the German skull was limited, but the discovery in 1908 of an almost complete Neanderthal skeleton buried in a cave at La Chapelle-aux-Saints in the French Dordogne considerably augmented scientific knowledge, even if it did nothing to placate outraged public sensibilities (41;42;226;43). The picture that emerged from the French fossil was that of a stunted, crouching individual, squat and brutal in aspect, more apelike than human, and that conception of Neanderthal man has dominated popular imagination ever since. In fact, the La Chapelle skeleton was somewhat misleading, since later studies have shown that it belonged to a senile man who had suffered from severe arthritis of the jaws, spine, and possibly lower limbs for some years prior to his death. His two remaining teeth had been worn to stumps, and it was clear from his severe disabilities that he must have been almost entirely dependent upon the ministrations of his companions, caring for his bodily needs and even chewing his food for him. Subsequent

discoveries of Neanderthal fossils in Belgium, the Iberian Peninsula, and Italy, as well as in other French locations, have given a more balanced picture of the Western, so-called 'classic,' Neanderthal people, who inhabited western Europe at the onset of the last glaciation, the Würm, about 65,000 years ago and for some 40,000 years thereafter.

They were characterized by their large brains, those of males being between 1,525 cc and 1,640 cc, well above the modern average, and females from 1,300 cc to 1,425 cc. The crania are broad, low, widely curved outward over the earholes, with the occiput protuberant and bun shaped, overhanging the area of neck muscle attachment at the rear. Their foreheads are low and sloping, with brow ridges forming a bar above the nose root and then sweeping in curves over the eye orbits, to trail away behind. Their large faces project forward, dominated by long, broad noses, and their small cheekbones have no hollowing beneath them due to expanded sinuses. Their strong teeth are set forward in their jaws to match the extreme prognathism of the upper face (Fig. 24).

Contrary to popular image, Neanderthal man was not squat to

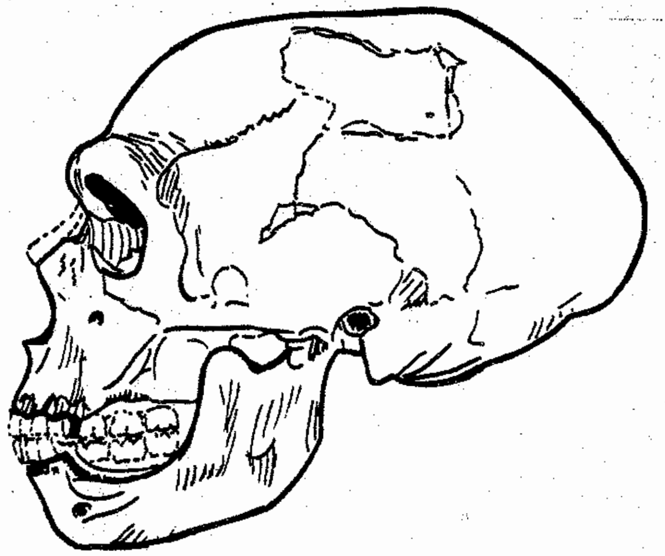


Figure 24. Reconstructed skull of Neanderthal man. (After M. Boule, *Ann Paleontol 7-8,* 1912–13.)

the point of deformity but stockily built, some 160 to 165 cm (5 ft. 4 in. to 5 ft. 6 in.) in height, deep chested, and with heavy, large-ended arm and leg bones, and large hands and feet, but with short fingers and toes. Furthermore, the idea that he shuffled along with a bent-knee gait, and was incapable of holding himself erect, was similarly ill-conceived and was largely due to a faulty reconstruction of the skull base of the La Chapelle fossil and a misinterpretation of the limb bones (15;318).

Neanderthal man was certainly muscular. The muscles of his upper back and neck must have been strong to support the weight of his large head and prowlike face, and his arms and legs would have been similarly well endowed. It has been said that from the point of view of general physique, the modern mountaineers of the Abruzzi Mountains, the Alps, and Bavaria bear no little resemblance to their Neanderthal predecessors, although whether that similarity stems from any direct genetic inheritance or is merely due to the demands of a common environment cannot be determined with certainty (100:548).

The two most distinctive features of the Neanderthal physiognomy must have been the flattened braincase, with its forehead sweeping back from the brow ridges, and the very large nasal prognathism, or 'beakiness' (Fig. 24). The Neanderthal nose projected like a prow, influencing every part of the face. Above it the brow ridges meet in a continuous ridge across the nasal root; below it the jaws are carried forward by the nasal skeleton and give the impression of being stretched out to match the protrusion of the upper face.

There must have been good reason for this extreme nasal prognathism. It is unlikely to have been the result of any supposed throwback to some more primitive form; this suborbital projection of the face is quite different from the alveolar prognathism of earlier hominids, which, as its name implies, relates only to the tooth-bearing portion of the upper jaw. One clue lies in the fact that those Neanderthal fossils found farther south than the French type-specimens, in the Mediterranean areas of Italy and Gibraltar, were less extreme in this regard. One might well expect populations living at the edge of the ice sheets to have developed some extra physiological, as well as cultural, protection against the cold.

The nose serves as a kind of radiator for the body. It warms and moistens inhaled air on its way to the lungs (325). People living in cold climates tend to have smaller nasal openings in the skull than others in warmer climes, restricting the amount of icy air that can flow directly to the lungs and allowing more time for it to be raised nearer to body temperature (375;121;403). This provision is the more important when, like the Neanderthals, they share other characteristics of cold-adapted peoples in having short necks and broad, low skulls, bringing their lungs closer to the nose than is the case with many long-necked tropical peoples. Neanderthal man was, however, unable to develop restricted nasal apertures in this way since their breadth was determined by the size of his front teeth, in accordance with a long-established anatomical correlation between nasal opening and intercanine breadth (349). It seems possible, therefore, that the nose itself lengthened to compensate for the unrestricted airflow.

Even more important than the protection of the lungs from frostbite in extreme cold is the safeguarding of the brain. This highly vulnerable organ had already reached its optimum size in Neanderthal man. It monopolized some 12 percent of the body's available blood supply, even at rest (348), and was required to be maintained within a very narrow thermal range; only the visceral organs, which are better insulated by the body mass, are as critical in this regard. As the arteries carrying blood to the brain lie quite close to the nasal passages, a larger nose would have offered some added protection for this vital supply.

But the size of his nasal skeleton is not the only indication that Neanderthal man needed to adapt to the freezing conditions of Würm I. The face of the Greenland Eskimo is saved from frost bite by an unusually strong supply of blood to his cheeks and chin (259). The blood vessels concerned pass through holes in the facial skeleton; those through the cheekbones are called the *infraorbital foramina,* and those piercing the chin are called the *mental foramina* (Latin *mentum,* 'chin'). It is possible to judge the amount of blood flowing through these apertures by their size. Like the Eskimo, Neanderthal man was equipped with large-bore foramina in both places, and often with more than the usual single foramen on each side. This multiplicity of channels and their large diameter ensured a supply of warm blood to the skin six or seven times the amount available to his modern European successor (100:534).

Teeth also can tell us something about the kind of climate in which their owners lived. The old man of La Chapelle had lost all but two of his, and the premolars that remained had been worn to stumps. Similarly, all the Neanderthal teeth recovered, apart from those that had belonged to very young children, had been overworked and showed signs of having been used for purposes other than chewing food. In one French skull (La Ferrassie I), the outer surfaces of the upper incisors and left upper canine are polished down as if they had been used for holding pieces of skin, or thongs, in the teeth, and in the lower jaw there is a gap between the left second incisor and the canine. The two teeth had been twisted away from each other, and there is a pit in the outer surface of the mandible, exposing the root of the left lower canine. There are also similar gaps between the first and second premolars on either side of the lower jaw. To these dental peculiarities may be added the further evidence of special muscular developments related to movements of the mandible; all indicate the use of teeth for softening skins, such as may be used for clothing. An abundance of flint tools identifiable as fleshers for scraping raw skins supports the idea.

The short, compact, and heavy build of the Western Neanderthal would also have helped him endure the cold. It was long ago suggested by the German physiologist Carl Bergmann that in any given species the warm-blooded animals that live in cold places tend to have greater body bulk than those living in hot regions, the idea being that the bigger the body, all else being equal, the less heat loss per unit of volume (33). This 'law' was later extended by J. A. Allen, the American zoologist, who stated that in any one species, animals that have adapted to cold conditions have shorter extremities than their counterparts in warm regions, within the functional limits of the organs concerned; the nearer the body comes to being a perfect sphere, the smaller its surface area per unit of volume (8).

The classic example of this tendency is that of the fox, whose various species are distinguished by different-sized ears to accord with the climate experienced in their respective habitats. Thus the desert fox has the largest ears, the common fox the next largest, and the arctic fox the smallest (7). The combined theories hold good for the human species, for, generally speaking, people who live in cold places are shorter and heavier than the inhabitants of the tropics. One has only to compare the squat, short-limbed, and short-necked people of the Arctic regions with the lean, wiry desert Arab or the beanpole physique and long neck of the Nilotics, Somalis, Masai, and other black-skinned people of the Sahara, Sudan, and Horn of Africa.

The size and shape of the feet of people who live without adequate footwear in cold places also have their tale to tell. While much of the adaptation of the extremities to cold has to do with an increased flow of arterial blood and a high rate of basal metabolism, such races tend to have very broad feet and short toes, in keeping with this correlation of general physique to climate. Happily, we are not entirely dependent upon skeletal evidence for our knowledge of the Neanderthal foot, for prints made by a living member of that variety of man have been found impressed into the clay floor of an Italian cave. They are very wide, in heel, ball, and toes, and the latter, apart from the great toe, are very short (301). The prints have been compared with very similar marks made by the foot of a modern Alakaluf Indian of Wellington Island, Chile, used to walking daily in icy seawater and snow, and whose remarkable physiological adaptations to the bitter climate have been the subject of some important field research (Fig. 25) (203;100:547,556).

Since the initial discoveries of the classic Neanderthals of western Europe, it has become clear that they represent only one, rather specialized, type within a much more widespread variety of early *Homo sapiens.* Furthermore, even in this restricted area, the ice barriers formed by glacial pincers of the Scandinavian ice sheet creeping southwestwards in central Poland, and the Alpine glaciers moving to the northeast, towards the Carpathians and the Danube, subdivided the Western Neanderthals into those living in France, Belgium, and western Germany, those inhabiting the Iberian Peninsula, and the Italian communities. This last population may have been the oldest, for the characteristic stone-tool industry of the Neanderthals, the so-called Mousterian flake culture, has been

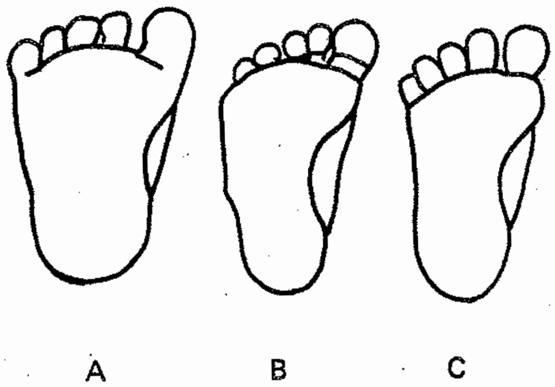


Figure 25. Neanderthal feet. A and C. Neanderthal footprints from a cave at Basua, Toirano, Italy, compared with a footprint (B) taken from the right foot of an Alakaluf Indian woman, from Wellington Island, Chile. (After C. S. Coon, *Origin of Races*, 1962, p. 556, Fig. 75.)

traced in Italy back to the Riss Glacial period, where it seems to have evolved locally (37). The Italian skulls of the Last (Riss-Würm) Interglacial show more neanderthaloid features than any other of the fossils in this early *sapiens* grade, not least in their long and broad nasal skeleton, with accompanying prognathism of the upper face (353;354).

Some authorities, indeed, apply the type-name Neanderthal to the Riss-Würm people in general and bring them within that classification, maintaining that the classic, more extreme Neanderthals of western Europe were merely an evolutionary offshoot from the main stream of human development. The ice sheets had cut them off from the rest of the neanderthaloid world, and they had been left to develop and accentuate their own morphological traits to suit the exigencies of their environment (219;355;406).

The longer and more completely breeding populations of a single species are separated from one another, the more widely they differ. The extreme conditions faced by the western Neanderthals could have given rise to the adaptive characteristics we have noted, and if, as seems likely, their breeding populations were small and separated from one another, the resultant inbreeding within each community would have tended to accentuate the various inherited characteristics of the subrace.

Around 50,000 years ago, the freezing conditions of the Last Glacial gave way to a milder phase, called an interstadial, of shorter duration and less warm than a full interglacial. The European Neanderthals appear to have persisted fairly well into this period, the so-called Göttweig Interstadial (Würm I–II), which lasted about 10,000 years. Probably they had disappeared by about 40,000 years ago, but how exactly they were replaced by the next grade of *Homo sapiens* is much disputed. In Europe, nearly all cave and rockshelter sites showing repeated human occupation offer only a sterile layer between the last Neanderthal use, marked by their Mousterian culture, and the succeeding blade industry of our more immediate predecessors, Cromagnon (Crô-Magnon) man, named after the type-locality in the Dordogne, where five human skeletons were found (Fig. 26). This archaeological break leaves unanswered the question of whether the two populations overlapped and the Neanderthals succumbed to their more anatomically advanced successors, or whether they had already disappeared before Cromagnon man appeared on the scene. In any case, the common assumption that if they met the Neanderthals would have been exterminated by the newcomers does not necessarily follow; they could have been absorbed and thus passed on genetically some of their specialized traits. There appears to be no biological barrier to such hybridization, for, contrary to earlier opinion, there is no sound reason for according the Neanderthals a new specific status and thus denying the possibility of fertile union between the two populations. On the other hand, one has to admit that if the graphic reconstructions we see of our Neanderthal ancestors are at all accurate, Cromagnon man must have been remarkably indiscriminate in his choice of mate or favoured with an uncontrollable sex drive.

There is one part of the world where such a miscegenation does seem to have taken place and borne important fruit. In southwestern Asia there is evidence for a contemporaneous existence of fundamentally modern peoples with others more typically neanderthaloid. In the 1930s, in two adjoining caves on the slopes of Mount Carmel in Palestine, were found a series of skeletons covering the last (Riss-Würm) Interglacial period and the opening stages of the succeeding Würm glaciation (174;175;271). They range

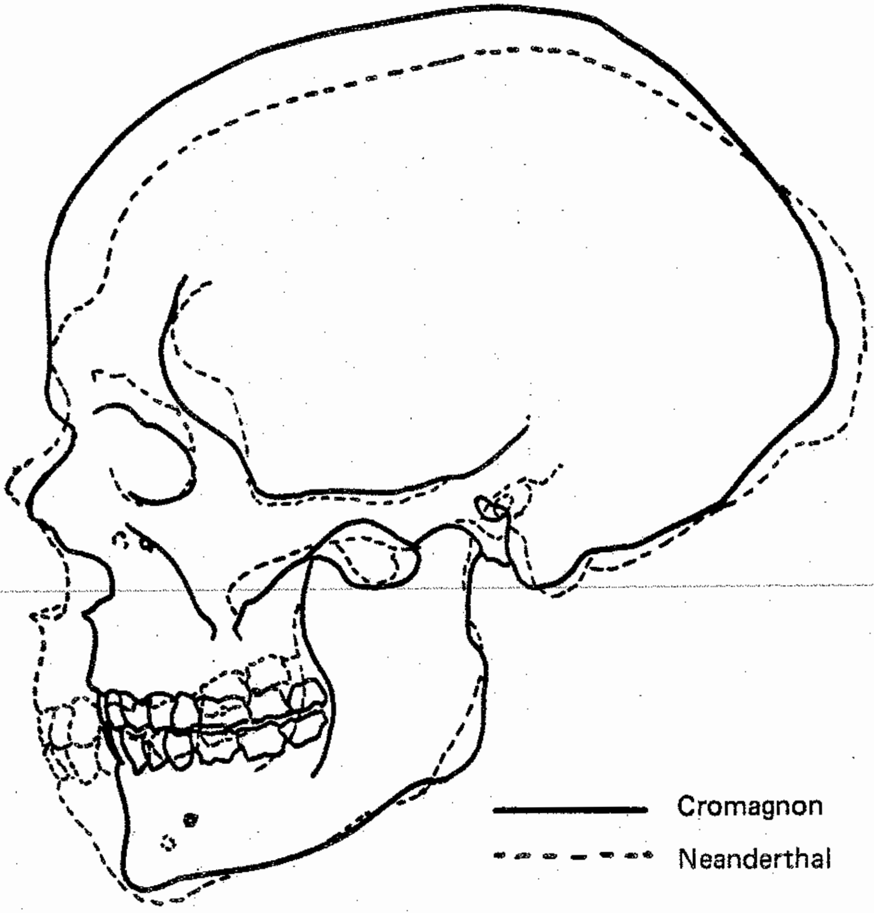


Figure 26. Craniogram of a Cromagnon skull outline compared with a Neanderthal skull (La Chapelle-aux-Saints). (After M. F. Ashley Montagu, *Introduction to Physical Anthropology*, 1960, p. 217, Fig. 120.)

in grade from near-Neanderthal found in one cave, called Tabun, similar in type to the Riss-Würm populations of Europe, to something closer to modern man in another cave, Skhūl. Both communities possessed flake tools made in the same so-called Levalloiso-Mousterian tradition, but the fauna of Tabun is perhaps somewhat more archaic (62;211).

The two groups are fundamentally so similar that it seems to many authorities that their differences could not have arisen

spontaneously by mutation. They conclude that they must have been the expression of a fairly recent infusion of new genes into the Mount Carmel neanderthaloids, producing the strangely hybrid types found there and elsewhere in the area (98;100;293;294;130;373). The objection that has been raised to this hybridization theory, apart from any aesthetic problems in the choice of mates, is that one would have to presume the existence of the two fully developed types of Neanderthal and modern man at the same time, and neither has yet appeared in the excavations (271;43).

Clearly the problem is not going to be solved without a great deal more fossil evidence, but the discovery of hybrid types of man in Palestine is a warning against the assumption that all advances in human evolution have been the result of linear genetic relationships between primitive and more modern types, the 'higher' grades necessarily following the 'lower' ones. Neanderthal man was himself a hybrid, combining what we should call very 'primitive' features, reminiscent of Chinese populations of *Homo erectus* (Peking man) with a larger brain well into the *sapiens* range. The old idea that Neanderthal man was a brutish and inadequate creature, inevitably outclassed and eventually wiped out by his more advanced successor, Cromagnon man, is no longer tenable. It is more probable that the latter is a hybrid owing some part of his genotype to Neanderthal ancestry, and that this element may well have contributed in no small measure to the robustness of the Late Palaeolithic Caucasoid. It would accord well with the history of the Near East, and the Fertile Crescent in particular, if this area were to prove the prime mixing bowl of several genetic strains and the point of dispersal for a number of new ethnic taxa.

It would be interesting to know the precise origin of Neanderthal man, or at least those features by which his fossil remains are most clearly distinguished. Materially, the Neanderthaler was not, perhaps, in the forefront of cultural innovators, but the adoption of skin clothing, indicated by the number of fleshing tools he left in his sites, significantly extended his range of movement into territories having more rigorous climates. By the beginning of Würm, their settlements extended as far north as southern England, and along the northern foothills of the central European upland zone from the Ardennes to the headwaters of the Vistula; and thence from the middle Dniester to the Dnieper, and to the Donetz near Vorochilovgrad. Farther east the precise frontier of their expansion is uncertain, but there is sure evidence that the flake-tool people not only penetrated the Zagros mountains of southwestern Persia but also expanded north of the Iranian plateau to the east of the Caspian, and on to the regions of Samarkand and Baisun in eastern Uzbekistan. There are also traces of Mousterian culture in the Irkutsk region, near the southern end of Lake Baykal, indicating a penetration of inner Siberia. Indeed, flint assemblages from the Ordos district in the northern loop of the Hwang Ho (Huangho) suggest that Neanderthal man's culture reached as far as northern China.

The American anthropologist Carleton Coon suggested that this culture trail might offer a solution to our problem of the origin of the Neanderthal genotype, bearing in mind the correspondence already noted with the Chinese specimen of *Homo erectus*, Peking man. He proposed that the neanderthaloid genes travelled from some 'pro-Mongoloid' *erectus* population, across the mountain spine of North-Central Asia and into western Asia and Europe. Noting some striking similarities also between skeletal features in the African Bushman and Neanderthal man (271), Coon thought the point of entry into southern Europe could well have been via North Africa, the supposed original home of the Bushman, and across the Mediterranean into Sicily (100:576). It is significant that, as we noted above, the Riss-Würm fossils of Italy are the first to show neanderthaloid traits. Once in Europe, natural selection and the accentuation of adaptive features in small, isolated communities would have given the Western Neanderthals those extreme characteristics which contributed to their survival in their ice-bound hunting grounds. Later, when the onset of the Göttweig Interstadial ameliorated the harshness of the climate, the hybrid communities that had evolved in southwestern Asia moved westwards, bringing their new Upper Palaeolithic blade culture with them (100:578).

It has to be borne in mind, when considering the possibility of human movements across these vast areas of the ancient world, that during the last glaciation the terrain was much more of a unity and allowed much greater freedom of movement overland than it does today. Lower sea levels meant, for instance, that Anatolia, and thus the west Asiatic hinterland, was joined by dry land to the Balkans and so to central and western Europe; the Crimea formed part of a continuous unindented plain from the Caucasus to central Europe; the head of the present Adriatic was dry land, giving easier access from the Danube basin to Italy and south France; and the ice-free parts of Britain were joined to the continental mainland (87).

If Coon's theory turns out to be substantially correct, it would mean that present-day European Caucasoids owe an important part of their genetic inheritance to Mongoloid influence, perhaps not least in the cold-adaptive characteristics of our northern populations. In any case, there is an increasing willingness on the part of modern anthropologists to acknowledge that Neanderthal man did not die out completely without issue as an aberrant, over-specialized, or otherwise peculiar offshoot of human evolution, doomed to extinction (41;42), but at least in less extreme forms was a highly successful and widespread ancestor of modern man, contributing a vital element to the Caucasoid subspecies (50).

The 10,000 years or so of the Göttweig Interstadial was a period of mild but not hot weather. During this time the Neanderthals were replaced, as we saw, with an Upper or Advanced Palaeolithic people, and their blade culture endured until the end of the Ice Age, about 8,000 BC. The type-specimens of this Stone Age man are the skeletons of Cromagnon. The initial discovery in 1868 was soon followed by a whole series of similar finds in caves of the Red Rocks of Grimaldi, near Mentone on the Italian Riviera, just across the French frontier. Now Upper Palaeolithic man has appeared in sites scattered throughout Europe and in Iran, matching the geographical distribution of their Neanderthal predecessors and contemporaries. In general, the places that were too cold for comfortable habitation in Würm I were avoided after the Interstadial. Successive cold phases of the last glaciation, Würm II and III, drove the Europeans to the favoured resorts in southern France and similar areas.

The Upper Palaeolithic people were, in effect, modern Caucasoids. Suitably attired, they would pass in any Western society without undue comment. They were not remarkably tall, the mean for adult male skeletons being about 170 cm (5 ft. 8 in.) and for females 152½ cm (5 ft. 1 in.). Their long, slender bones indicate a lean body build, with hands and feet to match, to judge from silhouettes stencilled on cave walls (79) and from footprints on cavern floors (389).

Their skulls were large, with cranial capacities up to and beyond the modern average, male and female heads showing as marked a difference in this regard as in their respective statures; the average male capacity measured 1,580 cc and the female averaged 1,370 cc. Braincases were very long and moderately broad and high, of fully modern proportions. The face, on the other hand, has struck observers as disproportionately short and broad, wider in fact across the cheekbones than the cranium. This width of face is unusual in Caucasoids, but it does find a parallel among modern Eskimos and is probably attributable to a common cause, the development of the chewing muscles and their bone attachments for the mastication of tough meat (216;100). Brow ridges were slight, noses narrow, and chins notably prominent.

The Upper Palaeolithic people were great artists, but they chose to depict animals in their cave wall paintings and engravings rather than humans, and the examples that do exist are more caricatures than realistic portraits (191;386). Female figurines of clay and bas-relief carvings on cave walls emphasize the sex organs in grossly exaggerated forms, with large, pendulous breasts and distended bellies, indicating a magicoreligious symbolism more than attempts at naturalistic representation (265).

Technically more sophisticated tools and weapons enabled Upper Palaeolithic man to advance the art of hunting and trapping to a higher level than ever before possible, and they thereby established mankind as the biologically dominant species. From this secure base, they were able to explore the avenues of feeling and self-expression that foreshadowed the achievements of modern Western civilization. It is no coincidence that the next great economic and social advances in human endeavour, in food production and urban life, took place in precisely those southwestern Asian areas of racial mix and dissemination that saw the birth of the Upper Palaeolithic Caucasoids.

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INDEX

A

a-glands (*see* Apocrine)
Abdomen, 93
Aborigines, Australian, xxv, 40, 41, 47, 60, 62, 66, 68, 76, 78–83, 106, 108
Abruzzi Mountains, 116
Achondroplasia, chondrodystrophia fetalis, 5, 6
Adaptability, adaptation (environmental), 7f., 10, 22, 31, 36, 38, 39, 40, 42, 46, 59, 60, 76, 78, 81, 84, 88, 91, 92, 98, 100, 101, 102, 103, 106, 108, 111, 120, 124, 125
Adrenal cortex, glands, 35, 42
Adriatic Sea, 125
Afghans, 57
Africa, vii, x, xii, xv, xvi, 23, 29, 34, 36, 37, 38, 41, 45, 52, 59, 61, 66, 76, 83, 84–97, 99, 109, 111, 124; Central, 111; East, 85, 90, 111; Horn of, 119; North, 37, 70, 85, 90, 96, 111, 124; South, southern, 85, 90; South-West (Namibia), 90; West, 66, 84, 90, 111
Agglutination, of blood cells, 65
Agglutinins, agglutinogens, 65
Aggression, non-aggression (*see also* Defence), 25, 33, 35, 42
Agriculture, 23, 26, 28, 34, 37, 79, 87, 98, 126
Ainus, 66, 76
Alae (*see also* Nostrils), 86, 89
Åland Islands, 54
Albino, 106
Albus, vi
Alleles, 63, 64, 66
Allen, J. A., 118
'Almond' eyes, 77
Alpines, vii, 54, 55–57, 70, 73, 99
Alps, xi, xii, xiv, 55, 116, 119
Altitude limitations, physical, 37, 101, 108
Alveolar, 57, 116; prognathism, 74, 76, 116
Amazon, vii, 73
America, Americans, vi, vii, 118, 124
America, North (*see also* New World), xi, xiii, 5, 43, 44, 72, 105; South, Latin, viii, 69, 72, 99, 105
American University, Washington, D.C., 98
Americanus, vi
Amino acid, 30
Amphibians, 11, 13
Anaemia, 37, 64, 68
Anatolia, 125
Andaman Islands, 87, 99
Andes, *altiplano*, 101, 108
Angola, 90
Anthropoidea, viii
Anthropology, anthropologists, 23, 29, 37, 44, 46, 58, 60, 62, 65, 70, 71, 77, 78, 79, 83, 84, 90, 96, 111, 124, 125
Anus, 53
Apes, viii, ix, x, xi, xvii, xxi, 13, 14, 15, 16, 24, 25, 26, 36, 47, 51, 62, 79, 80, 114
Apocrine (*a*-) glands, 18, 19, 52, 53, 54, 77, 85, 89, 93
Arabians (desert Arabs), 57, 92, 119
Arabs (ethnic), 85
Aral Sea, xv
Archaeology, 23, 27, 114f., 119–126
Arctic Ocean, xiii, xiv, 92, 119
Ardennes, 123
Areolae, mamma areolata, 82, 94
Arm, arm bones, 88, 116; lower (forearm), 49, 77, 85, 86, 88; upper, 20, 49, 53, 91
Arm-to-leg ratio, 49
Armenians, 70
Armpits (axillae), 17, 52, 53
Art, 44, 111; cave, 126
Arteries (*see also* Blood vessels), 35, 117
Arteriosclerosis, 35
Arthritis, 114
Asia, vii, 45, 66, 68, 71, 72, 73, 84, 96, 98, 99, 104, 111; Minor, 55; North-Central, 124; Southeast, vii, 73, 78, 88, 99, 112; southwestern, 121, 124, 126; western, 124, 125
Assam, 73
Atherosclerosis, 35
Athletic competitions, 107f.

tlantic Ocean, xiii, xxiv, 34
tmospheric poisoning, 7
ustralia, vii, 60, 61, 68, 78, 104
ustraloid, vii, xxv, 41, 44, 47, 48, 49, 51, 61, 62, 63, 67, 68, 76, 78–83, 87, 92, 99, 101, 103, 107, 108
ustralopithecus, x, xv, xvii, xviii, xix, 16, 24, 26, 27, 34, 46, 47, 49, 76, 84, 96

B

aboons, 25, 32
acteria, 53
aelz, E., 74
aisun, 124
aker, J. R., 48, 51, 56, 95
alance of nature, 7, 98
alkans, 55, 125
ambuti, 86
antu, 90
arter economy, 87
avaria, 116
aykal, Lake, 124
ear, xiv
ehaviour, 34, 42, 107; behaviourism, behavioural pyschology, 43, 107, 111
elgium, 115, 119
elly, 126
engal, Bay of, 87
erbers, 85
ergmann, Carl, 118
hutan, 99
igotry, vi
iochemistry, 36–38, 63–71, 112
iopsychology, 43, 44, 112
ipedalism (*see also* Erect posture), xi, xvii, xviii, 9, 15, 23, 50, 59
irds, 11, 32
ison, xiv
lasphemy, 114
lood cells, 37, 38, 64, 65, 89; blood chemistry, 20, 37, 38, 44, 64–71, 101, 102; corpuscles, 65, 101; groups, 65–71, 80; parental incompatibility, 68; blood supply, 9, 37, 65, 102, 117f., 119; vessels (*see also* Arteries), 37, 65, 117
lumenbach, J. F., 45
ody build, 20, 57, 77, 85, 88, 89, 91, 92, 107f., 115f., 118f., 126; fat, 42, 93; hygiene, 53; liquids, 91; odours, 17, 18, 51, 52, 53, 54, 89, 93, 102; weight, 42, 88
Boers, 90
Bohemian, 56
Bone structure, 20, 126; bony crests, 89
Boule, M., 115
Bows and arrows, 91
Brachiation, xi, xxiv
Brachycephaly (round-headedness), 19, 20, 55, 56, 57, 73
Brain, xx, xxi, 8, 9, 14, 15, 22, 30, 42, 73, 108, 117; cerebral hemispheres, 80, 81; complexity, development, xxiv, 9, 10, 15, 23, 27, 28, 33, 34, 42, 79, 80, 84; frontal lobes, 27; occipital lobes, 80; size (cranial capacity), xvii, xviii, xxi, xxiv, 20, 24, 27, 73, 80, 92, 114, 115, 117, 123, 126; sulcus lunatus, 80, 81; vulnerability to temperature, 117
Brain case, pan, xviii, xix, xxi, 15, 19, 20, 47, 77, 80, 108, 116, 126
Breasts (*see also* Areolae, Gynecomasty), 82, 89, 126
Breeding isolate, group, population, v, vi, vii, xxi, xxii, xxiii, xxiv, xxv, 3, 6, 7, 10, 22, 29, 31, 32, 33, 34, 36, 38, 39, 40, 54, 98, 99, 100, 101, 106, 111, 116, 119, 120, 121, 124
British Isles, British, Great Britain, vi, 39, 40, 55, 70, 90, 105, 125
Brow, brow ridges, xviii, xix, xxv, 16, 20, 47, 80, 86, 108, 114, 115, 116, 126
Buckteeth (psaliodont occlusion), 49, 75, 110
Bushmen, 20, 36, 41, 60, 76, 82, 89–96, 107, 124
Buttocks, 50, 85, 93f.

C

Camels, xxi, 94
Cancer, 68
Canines (*see also* Dentition), 24, 25, 49, 73, 117, 118
Cannibalism, xxi
Cape of Good Hope, Province, 89, 90, 94
Cape Town, 94
Capitalism, 108
Capoid, vii, xxv, 20, 41, 44, 67, 68, 76, 85, 89–97, 101
Carabelli's cusp (*see also* Dentition), 49
Carmel, Mount, 121–23
Carnivores, x
Carpathians, 119
Caspian Sea, xv, 124
Cats, 9, 13f.; Manx, 13f.; sabre-toothed, xiv
Cattle-breeding, 34, 90
Caucasoid, vi, vii, xxiii, xxiv, xxv, 20, 41, 44, 45–58, 59, 60, 61, 62, 63, 64, 66, 67, 68, 69, 70, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 85, 86, 92, 93, 96, 99, 101, 104, 106, 107, 109, 110, 111, 112, 123, 125, 126
Caucasus, Caucasian, xii, 45, 125
Caves, 114, 119, 121, 125, 126
Ceboidea (Cebus), viii
Cell division, 3
Celts, 70
Cenozoic, ix
Centrum (*see also* Vertebrae), 50, 51, 79
Cercopithecidae, Cercopithecoidea (*see* Monkeys, Old World)
Cerebral hemispheres (*see* Brain)
Ceruminous glands (*see also* Earwax), 77
Cervix, 55
Cevennes Mountains, 55
Chad, Lake, xv
Cheekbones (*see also* Zygomatic arch), 21, 47, 57, 73, 76, 80, 86, 92, 93, 107, 115, 117, 126
Cheeks, 86, 93, 117
Cheetahs, 25
Chest, 57, 77, 86, 116
Chewing, action, 24, 25, 26, 46, 74, 75, 76, 114, 118, 126; muscles, 73, 74, 80, 118, 126
Chicken, 13
Chimpanzees, viii, 9, 17, 23, 32, 33, 62, 88
Chin, xxv, 16, 55, 57, 80, 86, 89, 117, 126
China, Chinese, vii, xx, xxi, xxv, 41, 44, 68, 72, 73, 74, 76, 77, 83, 96, 104, 109, 110, 111, 112, 124
Cholestrol, 35
Chordata, 11
Chromosomes, 3, 63, 64
Cingulum (*see also* Dentition), xxi, xxii, 75
Civilization, independent, distinctive, 84, 111, 126
Civilized life, 38
Clark, W. E. Le Gros, ix
Cleft lip, palate, 30
Climate, climatic changes, xii, xiv, xv, 116–125; conditioning, v, 7, 9, 29, 57, 59, 60, 74, 84, 88, 91, 92, 100, 106, 116–19, 124, 125
Clines, clinal zones, 41, 99, 106, 110, 111, 112
Clitoris, 94
Clothing, 118, 123, 125
Coccyx, 13
Cognitive ability (*see also* Intelligence), 43, 44
Colour vision, xxiv
Communal relationships, 27, 28
Communication (*see also* Speech), 27, 28
Competitiveness, human, 79
Conceptual thought, imagination (*see also* Intelligence), xviii, 7, 9, 27, 28, 98, 126
Cone (dental excrescence) (*see also* Dentition), 75
Congoid, vii, xxv, 20, 38, 41, 44, 45, 52, 59, 61, 64, 67, 77, 81, 84–89, 90, 96, 99, 106, 107, 109, 111
Consciousness, human, 28
Cook, James, 94
Coon, C. S., xix, xxii, 18, 67, 120, 125
Copenhagen, 5
Corsica, 70
Cosmetics, 102
Cows, 63
Cradle of mankind, 84
Cranium, xviii, xix, 14, 73, 77, 80, 115, 126; capacity (*see* Brain size)
Crimea, 125
Cromagnon (Crô-Magnon), 121, 122, 123, 125
Crowding, over-population (*see also* Population control), 22, 29, 32, 34, 35, 36, 38, 108, 110
Culture, vi, xxi, xxiv, 7, 10, 22, 23, 27, 29, 31, 34, 36, 37, 38, 39, 40, 43, 59, 68, 69, 70, 71, 78, 79, 96, 98, 101, 102–13, 119, 121, 123, 124, 126; cultural conflict, 103, 104, 109; diversity, 44, 54, 68, 102–13; irritants in society, 104; standardization, 40f.
Cusp (dental), 49

D

Danube, River, basin, 119, 125
Darwin, Australia, 81
Darwin, Charles, 4, 11, 12, 13, 84, 114
Dating, radiological, xiv
Dead Sea, xv
Deciduous (milk) teeth (*see also* Dentition), 16, 25
Deer, 60, 88
Defence, 24, 25, 42
Denmark, 54
Dentition (*see also* canines, deciduous, molars, premolars, etc.), xvii, xix, xx, xxi, xxii, 5, 16, 24, 25, 26, 27, 48f., 73–76, 80, 85, 102, 114, 115, 116, 118; dental abnormalities, xxi, xxii, 49, 75, 76; caries, 63; roots, 76
Deoxyribonucleic acid (DNA), 3
Dependency, infantile, senile, 19, 114
Dermatoglyphics (*see* Fingerprints)
Dermis, epidermis (*see* Skin)
Desert, 92, 94
Diabetes, 30, 68
Diastema (*see also* Dentition), xix, 25
Diets, 25, 26, 27, 29, 30, 35, 36, 87

Digits (of limbs), 5
Dingo (*see also* Dog), 79
Diplomacy, 44
Disease resistance, 69; susceptibility, 35–38, 63, 68; vectors, 36
Distribution, human, racial, 39, 40, 41
Dnieper, River, xii, 124
Dniester, River, 124
Dogs, xxiii, 9, 17, 25, 41, 42, 79
Dogteeth (*see* Canines)
Dolichocephaly, dolichocranialism (long-headedness), 56, 57, 73, 80, 85, 92
Domestication, domestic animals, 23, 79, 88
Don, River, xii
Donetz, River, 124
Dordogne, France, 114, 121
Drugs, therapeutic (*see also* Medicine), 22, 29, 102
Dung-beetle, 36
Düsseldorf, 114
Dutch, 89, 90
Dwarfism, 87–89, 90, 99

E

-gland (*see* Eccrine)
Ears, 11, 16, 20, 21, 47, 57, 85, 93, 118; earholes, 115; lobes, 93, wax, 77
Eccrine (*e*-)glands, 9, 18, 52, 102
Ecology, ecological environment, v, x, xxi, 3, 6, 7, 10, 21, 23, 31, 34, 39, 40, 52, 64, 79, 87, 88, 98, 100, 101, 102
Economy, economic rivalry, 39, 79, 105, 108f., 110
ducation, 43
go, 28
gypt, Egyptians, 66
lbe, River, 54
lephants, xii, xiv, 88
mbryo, 11, 13, 17, 19, 21
motions, 17, 28, 103, 109
namel (dental), xxi, 49, 75, 76
ndocrine, neuroendocrine system, 19, 33, 35, 36, 42, 102, 107, 112
ndogamy, 40, 100, 103
ndurance, 91
ngland, Englishmen, xiv, 64, 66, 70, 123
nzymes, 30
ocene, x, xxiv, 5
pidemics, 103
Equidae (zebras, asses, horses), 5
Erect posture (*see also* Bipedalism), 50, 53, 116
Escherichia coli (bacteria), 4
Eskimoes, 66, 73, 74, 76, 92, 117, 126
Ethiopia, (Hamitic-) Ethiopians, vii, 52, 85
Ethmoid, 48
Ethmolacrimal suture, 48
Ethnic identity, 102
Eugenism, 101
Europe, Europeans, vii, xii, xiv, xxv, 27, 43, 45, 49, 54, 56, 66, 71, 74, 78, 82, 84, 96, 99, 109, 111, 112, 115, 118, 121, 123, 124, 125

F

Face, xxi, xxiii, xxiv, 5, 11, 16, 19, 20, 25, 47, 55, 57, 74, 86, 92, 93, 107, 115, 116, 126; facial expression, xxiii, xxiv; flatness, 16, 74; skeleton, 74, 76
Families, subfamilies, superfamilies (*see also* Phylum, Phylogeny), viii, x, xii, 7
Family background, 43; structures, relationships, 32, 33, 111
Far East, xx, xxi, xxiv, 34, 96, 110
Faroe Islands, 54
Fat, subcutaneous (*see also* Body fat), 85, 91, 94
Fear, 17, 42, 52
Feeding (*see also* Diet), 26, 29, 34
Fertile Crescent, 123
Fertility, human, 68f., 104, 126
Figurines, female, 126
Fiji, 103f.
Finch, O., 82
Fingers, 24, 60–62, 116; fingerprints, 60–62, 79
Finland, 54
Fire, xxi, 27, 28, 29
Fish, 11, 12, 13, 32
Flesh, 58, 59; fleshing tool, 118, 123
Foetus, foetal development, 11, 12, 13, 14, 15, 16, 19, 20, 22, 23, 52, 61, 69, 77, 92, 102
Follicles (*see* Hair)
Food supplies, 34, 36, 37, 49, 79, 87, 88, 90, 94, 109, 114, 126
Foot, 20, 77, 85, 91, 92, 116, 119, 120; arches, 85; ball, 119; heel, 86, 119; footprints, 119, 120, 126; sole, 9, 61, 119, 120
Foramen, infra-, suborbital, 16, 117; mental, 16, 117
Forehead, xviii, 20, 47, 57, 58, 73, 74, 76, 77, 80, 85, 86, 92, 115, 116

Forelimbs (*see also* Arm), 23, 25, 26
Foreskin, 55
Forest habitat, xi, 33
Fossils, viii, ix, xi, xiv, xv, xvii, xviii, xxi, 4, 5, 26, 27, 46, 58, 73, 76, 83, 96, 114, 115, 116, 120, 123, 124
Fox, 88, 118f.
France, Frenchmen, xiv, 55, 57, 114, 115, 116, 118, 119, 125
Freckling, 55
Friesland, East, 54
Fromm, Erich, v
Frontal bone, 16, 74, 80
Frostbite, 74, 117
Fruit fly (Drosophila), 4, 35

G

Galactosemia, 30
Genera, 5, 7
Genes, vii, xxi, xxiii, xxiv, 3, 5, 6, 8, 22, 30, 39, 42, 52, 57, 64, 66, 68, 71, 77, 88, 90, 100; dominant, 6, 10, 77, 82; flow, mixture, 7, 40, 41, 78, 81, 85, 87, 96, 98–113, 121, 123, 124; frequencies, 64, 66; pool, 3, 7, 10, 29, 31, 41, 54, 99, 100; recessive, 6, 10, 62, 63, 64, 100, 101
Genetic barriers, frontiers (*see also* Isolating factors, Racial boundaries), 41, 54; conditioning (of behaviour), 42, 43; constitution (*see* Genotype); dilution, 43, 103; drift, 39; engineering, 8, 41; equilibrium, 6, 8, 10, 100, 101; identity, 40, 101; integrity, 89; load, 6, 7, 10, 30, 31; programming, 35; tracers, 62f., 69, 70; variables, variability, 99, 101
Geneticists, 37, 39, 44, 62, 65, 111
Genitalia, 17, 53, 55, 94, 95, 96, 126
Genitoanal areas, 53
Genotype, v, xxiii, 19, 39, 40, 44, 52, 78, 96, 99, 100, 101, 123, 124
Genus, vi, xii
Geological periods, x, xi, xii
German, Germans, 54, 69, 114, 118, 119
Gibbon, 17, 32, 33
Gibraltar, 116
Gilbert, W. S., 3
Gills, 11
Glabella, 16, 80
Glacials, interglacials, x, xi, xii, xiv, 78, 115, 116, 120, 121, 125
Glaucoma, 63
Global politics, confrontation (*see also* Racial politics), 108–13
Goitre, goitrogenic agents, 63
Goodall, Jane, 33
Gorilla, viii, x, xvii, 9, 17, 18, 27, 32f.
Göttweig Interstadial (Würm I–II, *see also* Interstadials), xi, xv, 121, 124, 125
Gracián, Baltasar, 22
Greeks, 57; 'Greek' profile, 58
Greenland, 117
Grimaldi, Red Rocks of, 125
Gums, 85
Günz, Günz-Mindel (*see also* Glacials), xi, xiv
Gynecomasty, 89
Gypsies, 69

H

Haemoglobin (*see also* Blood chemistry), 37, 64
Hair, 17, 18, 42, 59–60; armpit (axillary), 17, 55, 89; balding, 55, 60, 72; body, 17, 20, 21, 53, 55, 57, 59, 73, 77, 81, 85, 86, 91, 92; colour, 55, 57, 72, 81; facial, 55, 57, 59, 73, 81, 85, 86; foetal (lanugo), 17, 20, 89; follicles, 18, 20, 52, 60, 89, 91; form, 57, 59, 60, 72, 81, 85, 91, 102; greying, 60, 72; pubic, 17, 53, 55, 89; scalp, 17, 55, 57, 59, 60, 81, 85, 89
Hands, handpalms, 20, 23, 24, 60, 77, 85, 91, 92, 116
Haptoglobin (Hp^1, Hp^2), 64
Hartz Mountains, xii
Head, orientation, 15, 17; shape (*see* Brachycephaly, Dolichocephaly, Mesocephaly, Skull)
Heart capacity, 101, 102; disease, 35
Hedgehogs, viii
Heidelberg, 69
Herd instinct, 28
Heredity, genetic, 3, 5, 6, 29, 30, 36, 38, 42, 57, 61, 62, 63, 85, 96, 100, 103, 107, 114, 116, 120, 123, 125
Heterozygous mating, 6, 63
Himalayas, 67, 68, 99, 101
Hindus, 69
Hippocrates, 112
Hippopotamus, xiv, 88
Hips, 58, 77
History, 109
Hominidae, hominids, viii, ix, x, xi, xii, xv, xvii, xxi, xxiii, xxv, 7, 14, 16, 23, 24, 26, 27, 28, 33, 34,

39, 46, 47, 49, 59, 60, 72, 73, 76, 78, 80, 83, 84, 96, 98, 108, 110, 116
Hominoidea, viii, 24, 25, 26, 33, 50, 63, 98
Homo erectus, x, xviii, xix, xx, xxi, xxiv, xxv, 25, 26, 27, 34, 49, 72, 77, 78, 96, 123, 124; transition to *sapiens* grade, xxi, xxii, xxiii, xxiv, xxv, 7, 78f., 110
Homo sapiens, vi, vii, x, xviii, xxi, xxii, xxiii, xxiv, xxv, 7, 13, 31, 35, 38, 39, 41, 45, 46, 54, 72, 77, 96, 98, 107, 119, 120, 121, 123
Homogeneity, 20, 66, 72, 83, 85, 90, 109, 110, 111, 112
Homozygous mating, 6, 10, 37, 64, 100, 101
Hormones, 20, 42; growth hormone (somatotrophin), 20, 35, 88; sex (female), 89
Horses (*see also* Equidae), xii, 5
Hottentots, 20, 90, 94
Humanitarianism, 22
Humidity, 20, 88, 92
Hungary, 69
Hunting, hunter, xxi, 27, 28, 29, 33, 40, 59, 79, 88, 90, 93, 98, 124, 126
Hwang Ho (Huangho), River, 124
Hybrids, hybridization, 54, 82, 87, 100, 101, 103, 104, 121, 123, 124
Hypothalamus, 35
Hyracotherium, 5

I

berian Peninsular (*see also* Gibraltar, Spain), 115, 119
ce Age (*see* Pleistocene)
ce sheets, glaciers (*see also* Glacials, Pleistocene), xiii, xiv, 116, 119, 124
celand, 54
d, 28
mperialism, 109
nadequacy, physical, mental, 20
nbreeding, 6, 88, 100, 101, 120
ncisors (*see also* dentition), 24, 25, 26, 48, 49, 73, 75, 118
ndia, Indians (Asiatic), vii, 57, 66, 69, 99, 104, 112
ndian Ocean, 68
ndians (American), vii, xxii, 61, 66, 68, 69, 73, 75, 92, 99; Alakaluf, 119, 120; Amazonian, 101
ndonesia, 73, 78, 99
nfant vulnerability, 19
nfantilism (paedomorphosis), 11–21, 77, 89, 91, 92, 93, 96
nfertility, 35
nge, William Ralph, 32
Insectivora, viii
Insects, 32, 77, 89
Insularity, 104, 105
Insulin, 30
Intellectual stimulation, 79, 112
Intelligence (*see also* Cognitive ability, Mental ability), 31; tests (Intelligence Quotient, IQ), 42, 43, 44
Interbreeding (specific), xxv, 7, 10, 40, 89, 90, 97, 98–113, 121
International rivalry, 108f.
Interstadials, xi, xv, 121, 124, 125
Intestinal parasites, 36
Iran (Persia), Iranians, 57, 124, 125
Ireland, 70, 99
Irkutsk, 124
Iron (trace element), 64
Isolating barriers, factors, mechanism (*see also* Racial barriers), 52, 54, 89, 98, 102, 109, 119, 120, 121
Italy, Italians, 57, 70, 115, 116, 119, 120, 124, 125
Ituri, 86

J

Japan, Japanese, vii, 41, 44, 49, 52, 53, 66, 68, 73, 75, 76, 77, 107, 110
Java, Java man, xviii, xx, xxi, xxv, 27, 76, 78, 80, 83, 108
Jaws, jawbones (*see also* Alveolar, Mandible, Mandibular fossa, Ramus), xviii, xix, xx, xxi, 16, 20, 21, 24, 25, 46, 73, 74, 76, 80, 85, 89, 114, 115, 116; muscles, 25, 26, 73
Jews, vi
Joints, flexibility, 85, 88f.

K

Kalahari Desert, 90
Kale, 63
Kashmiri, 101
Kennedy, John F., 98
Kidney, 64
Kipling, Rudyard, 72
Kirgiz, 99
Koreans, 53, 73

L

La Chapelle-aux-Saints, 114, 116, 118, 122
La Ferrassie I, 118
Labia, majora, minora, 53, 55, 94, 95f.
Lacrimal bone, 47, 48, 79
Lakes, the Great, xiii
Land routes, intercontinental, xxiv; transcontinental, 124f.
Land tenure, 103
Language, 44, 70, 87
Lanugo (*see* Hair, Foetal)
Lapps, 76
Leadership, 27
Legs, leg bones, 55, 81, 88, 114, 116; calves, 50, 85, 86; lower, 50, 77, 85, 86
Lemurs, viii, ix, x, 32
Leopards, 25
Levalloisian industry (*see also* Stone Ages), 122
Limbs, limb bones (*see also* Arms, Legs), 55, 57, 77, 85, 86, 107, 116
Linnaeus, Carolus, vi, x
Lions, xiv
Lips, 21, 57, 81, 85, 86, 89, 93
Liver, 30
Llama, 101
Lordosis (*see* Spinal curvature)
Loris (bush-baby), 88
Lumbar (*see also* Spinal column, Curvature), 50, 51, 77
Lungs, 64, 92, 101, 102, 117
Lynx, xiv

M

Madagascar, 72
Magicoreligious symbolism, 126
Malaria, 37, 38, 63
Malarial mosquito (Anopheles), 37, 38, 89
Malaya, Malay Peninsula, 87, 99
Mammals, vii, viii, x, xxiii, 11, 15, 18, 24, 41, 52, 88
Mammoths, xiv, 88
Mandible (*see also* Jaws), xix, 16, 46, 75, 93, 118
Mandibular fossa, 16, 20, 46
Mankind, unity of, xxv
Marmoset, 88
Marrow, bone, xxi
Masai, 52, 119
Mastoid processes, 16, 47
Maternal conditioning, 19
Maturity, immaturity, 19
Mecklenburg, 54
Medicine, medication (*see also* Drugs, Therapeutic), 30
Mediterranean Sea, xv, 57, 70, 96, 116, 124
Mediterraneans (sub-race), vii, 54, 55, 56, 57f., 70, 71, 99
Medulla, 60
Melanesians, 62, 103
Menopause, 102
Menstruation, 19, 102
Mental ability (*see also* Intelligence), 43; abnormalities, instability, 28, 29, 30, 42, 100, 112; attitudes, 107, 111, 112
Mentone, 125
Merino sheep, 60
Merychippus, 5
Mesocephaly, 73, 85, 86, 89
Mestizos, 99
Metabolism, basal, 102, 119
Mexico City, 108
Micronesians, 99
Middle Ages, 26
Middle East, 71
Migration, immigration, vii, 7, 9, 32, 34, 37f., 41, 69, 70, 71, 88, 90, 92, 96, 98, 99, 101, 103, 104, 105, 111, 112, 123, 124
Milk, 63
Mindel, Mindel-Riss (the Great Interglacial) (*see also* Glacials), xi, xiv, xviii, xxi
Miocene, x, 5, 24, 25, 98
Miohippus, 5
Miscegenation (*see also* Interbreeding), v, 7, 86, 96, 102, 103, 104, 113, 121
Molars (*see also* Dentition), 24, 25, 26, 49, 74, 75, 76
Moles, viii
Molluscs, xii
Mongolia, 66
Mongoloid, vii, xxi, xxii, xxiii, xxiv, xxv, 20, 41, 44, 45, 47, 49, 52, 53, 59, 60, 61, 62, 63, 66, 67, 68, 72–78, 91, 92, 99, 101, 103, 106, 107, 108, 109, 110, 111, 112, 124, 125
Monkeys, viii, ix, x, xxiv, 17, 25, 36, 87; macacque, xiv, 15, 32; New World (*see also* Ceboidea), viii, xxiv, 9, 32; Old World (*see also* Cercopithecidae), viii, xxiv, 24, 32, 80
Monogenesis, xxiii, 106f.
Mons pubis, 53
Montagu, M. F. Ashley, xvii, xx, 17, 122
Morphology, xxv, 47, 79, 90, 120
Mortality, 35f., 104

Moscow, 66, 109
Moths, 52, 54
Mousterian industry (*see also* Stone Ages), 119, 121, 122
Mouth, 73, 82, 93
Movius's Line, (*see* Racial Divide, the Great)
Multiracial society, 42, 44
Muscles, muscular build, control, 27, 85, 116
Music, dancing, 111
Mutation, rate of, 5, 6; genetic, v, xxi, 3, 4, 5, 8, 10, 19, 21, 22, 30, 37, 38, 39, 123

N

Nagas, 73
Nails, 19
Nakedness, 9, 17, 59
Namibia, (*see* Africa, South-West)
Nasal aperture (*apertura pyriformis*), 48; bones, xix, 16, 48, 81; function, 92, 117; passages, 92, 117; prognathism, 116; root (nasion), 16, 20, 48, 73, 77, 81, 89, 92, 115, 116; structure (*see also* Nose, Shape), 92, 115, 116, 117, 120
Natural history, historians, 94
Natural selection (*see also* Survival of the Fittest), 3, 4, 6, 7, 8, 10, 22, 26, 29, 30, 38, 39, 63, 68, 69, 77, 87, 100, 102, 124
Neanderthal ('New-Man'), Western, 'classic,' xxv, 78, 96, 114–26; Riss-Würm, 120
Neanderthaloids, 124
Near East, 123
Neck, 5, 25, 57, 81, 86, 91, 115, 116, 117, 119
Negritos, 87, 107
Negroes, Forest, 86, 87; Nilotic (Nilotids), 85, 86, 88, 119; True, 20, 37, 38, 41, 52, 62, 64, 66, 68, 81, 82, 84–86, 87, 88, 89, 93, 99, 107, 108, 111
Negroid, Negrid, 45, 84
Neolithic (*see also* Stone Ages), 70
Neoteny, 14, 15, 16, 19, 20
Nepal, 99
Nervous system, 33, 43
Netherlands, xii, 54
New Guinea, 78
New World, vi, vii, 66, 68, 69, 72, 111, 112
Nile, River, xv, 85
Nilotids (*see* Negroes, Nilotic)
Nipples, 53, 82, 94
Nomadism, 79
Nordics, vii, 54f., 56, 57, 58, 71, 99, 107
North East Frontier Agency, 99
Norway, 54
Nose, 74, 92; shape (*see also* Nasal structure), 20, 21, 42, 48, 55, 57, 58, 73, 80, 85, 86, 89, 92, 102, 115, 116, 126
Nostrils (*see also* Alae), 85, 86, 89
Nucleic acids, 3
Nurturing (Infants, Senile aged), 19, 28, 33, 114

O

Occiput, xix, 57, 73, 80, 85, 86, 115
Oceana, 68, 88
Oestrus, 19, 33
Old World, 68
Olduvai Gorge, xv, xvi
Olfactory sensitivity (*see also* Body odours), 52, 53, 54
Oligocene, x
Olympic Games, 107, 108
Orangutan, 14, 15, 18, 32, 76, 81
Orbits (*see* Eye cavities)
Orders, suborders, vii, viii
Ordos district, 124
Orohippus, 5
Orthogenesis, 4, 5
Orthognathy, 16, 21, 57, 93
Overbite (dental), 26, 49, 75
Overland travel, 90f.
Overpopulation (*see* Crowding)
Ox, musk, xiv
Oxygen supply, 37, 64

P

Pacific Ocean, Islands, xiii, 99, 112
Paedomorphosis (*see* Infantilism)
Pair bonding, sexual, 19, 32, 33
Palaeocene, viii
Palaeolithic (*see* Stone Ages)
Palaeontologist, palaeontology, viii, x, 25
Palate, xix, 57
Palestine, 121–23
Papuans, 62, 68
Parallel evolutionary development, xxiii, xxiv
Parental care (*see also* Nurturing), 19
Parietal, 16
Pearl (dental excrescence), 76

Peking, Peking man (*Sinanthropus pekinensis*), xx, xxi, xxii, xxv, 72, 73, 75, 76, 78, 80, 96, 123, 124
Pelvis, pelvic girdle, xvii, 13, 14, 51, 93
Penis, glans penis, 21, 53, 55, 82, 94, 96
Persia (*see* Iran)
Perspiration, 9f., 18, 52
Peru, 66
Pharynx, 11
Phenotype, v, 54, 77, 84, 100, 111
Phenylalanine (amino acid), 30
Phenylketonuria, 30
Phenylthiocarbamide (*see* PTC)
Phenylthiourea, 62
Philippines, 87, 99
Phonetic capabilities, 70f.
Phylum, phylogeny, x, 4, 11, 37, 38, 46, 49, 58, 73, 76, 83
Physical abnormalities, deformities, 30, 100, 114
Physiognomy, 116
Physiology, 118
Pigmentation (*see also* Skin colour), 82, 84, 85, 86
Pithecanthropus ('ape-man'), xviii, 98
Pituitary gland, xxi, 19, 35, 42, 88
Platysma, xxiii, xxiv
Pleistocene (Ice Age) (*see also* Glacials, Interglacials, Interstadials), x, xi, xii, xiii, xiv, xv, xviii, xix, xxi, xxiv, 5, 25, 26, 29, 39, 67, 73, 76, 78, 96, 98, 99, 115, 117, 119, 120, 121, 122, 123, 124, 125
Pliny the Elder, 84
Pliocene, x, 5
Pliohippus, 5
Pluvials, xv
Poland, 119
Political concepts, philosophies, 44, 108f., 111, 112
Polygenesis, xxiii, xxiv
Polymorphism, balanced, 63, 64, 100, 112
Polynesians, 99, 103
Pongidae, viii
Population control (*see also* Crowding), 22, 34f., 36; tracing (*see* Phylum, Phylogeny)
Portuguese, 57
Pottery, 26
Power grip, 24
Power politics, 36
Premolars (*see also* Dentition), 24, 49, 75, 118
Primates, vii, viii, ix, x, xxiii, xxiv, 15, 26, 29, 32, 33, 52, 63, 88
Primitivism, 14, 47, 51, 52, 62, 76, 79, 123
Prognathism, prognathy (*see also* Alveolar, Nasal prognathism), xix, 16, 80, 86, 93, 115, 116, 120
Pronunciation (*see* Phonetic capabilities)
Prosimii, viii
Proteins, 35; deficiency, 36
Protohippus, 5
Psaliodont occlusion (*see* Buckteeth)
PTC (phenylthiocarbamide), 62f., 80
Pterion, 16, 48
Puberty, 17, 53, 89, 94, 95, 102; schools, 87
Pugilism, 107f.
Pygmies (Congo), 20, 21, 59, 60, 61, 66, 84, 86–89, 107
Pyrenees, xii

Q

Quartz, quartzite, 79
Quaternary, x
Queensland, 81

R

Rabbit, 13
Race (subspecies), subrace, vii, 39–44, 45, 46, 52, 54, 83, 86, 88, 89, 99, 101, 103, 106, 109, 111, 113; definition of, concept, vi, 41, 106; discussion of, vf., 43, 44, 105f.; numbers of, vii, 82f.; separate development, 7, 42, 96, 98f., 101, 103
Racial advantages, 108; barriers, boundaries, grouping (*see also* Isolating barriers, Racial Divide, the Great), 41, 67, 68, 96, 98, 100, 101, 109, 110, 111, 112; comparisons, 43, 44, 61, 62, 65; discrimination, 104, 107; diversity, distinctiveness, 7, 10, 20, 27, 29, 31, 36, 38, 39, 40, 41, 42, 44, 46, 53, 54, 59, 60, 61, 62, 64, 68, 72, 74, 77, 83, 91, 96, 98, 100, 101, 103, 104, 105, 106, 107, 109, 111, 112, 113, 114, 120; Divide, the Great (Movius's Line), 63, 67, 68, 69, 72–83, 99, 109; domination, 103, 104, 105, 121; history (*see also* Phylum, Philogeny), 46; identification, 41, 54, 106; integration, 101, 103, 104, 105, 106; juxtaposition in society, 103, 104, 105, 113; minorities, 103, 104, 110, 111, 112; mixing (*see also* Genetic flow), 98–113, 126; politics, 41, 44, 54, 83, 105, 108f., 110; prejudice, vi, 105, 109; primacy, 45, 112f.; propaganda, 110; tolerance, 104, 105
Rain forest, 20, 37, 81, 84, 86, 87, 88, 90, 92
Ramus, 16

Rational judgement, 28
Recapitulation, 11, 23
Recognition signals, 33, 40
Reindeer, xiv
Religion, 29, 111
Reptiles, 11, 13
Resettlement, deportation, 105, 110f.
Rhesus factors (*see also* Blood groups), 68
Rheumatism, 68
Rhine, River, 54, 56
Rhinoceros, xiv
Richard II, 39, 45
Riss, Riss-Würm (Last Interglacial, *see also* Glacials), xi, xiv, xv, 78, 96, 120, 121, 122, 124
Rock drawing, painting, 95, 96
Rodents, 9, 35
Romanes, G. J., 12
Russia, xii, 55, 66, 71

S

Sacrum, 51, 79, 93
Sagittal ridge, xviii, 80
Sahara, xv, 29, 119
Sahul shelf, 78
St Louis, xiii
St Matthew's Gospel, 59
Salamander, 13
Salts, body, 10
Samarkand, 124
Sanitation, 36
Sardinia, 70
Savannah habitat, 33
Scandinavia, 70, 99, 119
Scent, scent organs, 53, 77
Schizophrenia, 42
Schleswig-Holstein, 54
Schultz, A. H., 15
Scotland, 70
Scrotum, 21, 53, 96
Sea levels, xii, 125
Semang, 87
Senegal, River, 86
Senile, 114
Sensory systems, xxi, 28, 43
Separatism (*see* Races, Separate development)
Serengeti Plain, xv
Serum, serology, 37, 65, 71
Settlement, of virgin territory, 68
Sewage, 36
Sex cells, glands (*see also* Hormones, Sex), 3, 6, 35; differences, 58, 92, 126; ratio, 35
Sexual stimulation, attraction, eroticism, 17, 18, 35, 52, 53, 54, 82, 94, 95, 121, 123; competitiveness, 33; encounters, 53, 121; maturity, 102, 104; receptiveness, 19, 33; relationships (*see also* Pair-bonding), 33; reproduction, 8, 35
Shakespeare, William, 39, 45
Sheep, fat-tailed, 94
Shoulder blade (scapula), 49
Shoulders, 49, 57
Shoveling (*see also* Dentition), xxi, xxii, 75
Shrews, viii, ix, x
Siberia, xii, 55, 66, 73, 124
Sicily, 70, 124
Sickle cells, sicklers, sickling (*see also* Blood chemistry), 37, 38, 63, 64, 89
Sikkim, 99
Sinanthropus pekinensis (*see* Peking man)
Sinus pudoris, 94
Sinuses, 115
Skeleton (body), 46, 51, 58, 77, 89, 92, 96, 114, 119, 121, 125
Skhūl, 22
Skin (dermis, epidermis), 19, 60, 61, 107, 118; appearance, surface, 85, 91, 93; colour (pigmentation), 42, 45, 46, 55, 57, 72, 82, 83, 84, 85, 86, 89, 102, 107, 111; lubrication, 9
Skins (hides), 118, 123
Skull (*see also* Brachycephaly, Dolichocephaly, Mesocephaly), xviii, xix, xxi, 15, 16, 18, 19, 20, 46, 47, 48, 55, 56, 57, 80, 85, 86, 89, 92, 93, 108, 114, 115, 116, 117, 118, 120, 122, 126
Slave, slavery, 85, 111
Slipped disc (*see also* Vertebral disc), 50
Social acceptability, 30; class, 43; cohesion, collaboration, interdependence, 28, 33, 34; discord, v, 103, 104, 105, 108f; harmony, 103, 104, 105, 107; legislation (anti-racial), 104f.; morality, 28, 105; rejection, 103; statistics, 105; welfare, 29, 44, 103, 104, 105, 110
Socialist (Soviet) bloc, 108, 109, 110
Somalis, 119
Spain, Spaniards, xiv, 57, 70, 99, 101
Specialization, v, 7, 8, 14, 40, 125
Speciation, 40, 100, 121

Species, subspecies (*see also* Race), vi, xxv, 5, 40, 41, 45, 52, 54, 72, 83, 100, 106, 118, 120, 121, 125; human, 7, 10, 29, 31, 40, 41, 45, 50f., 83, 91, 100, 102, 106, 108, 112, 114, 119, 126; prime (*varietas prima*), 45
Speech (*see also* Communication), xi, xviii, xxiii, xxiv, 27, 28
Sphenoid, 16, 48
Spinal column (*see also* Lumbar, Vertebrae), 8, 13, 14, 15, 50, 51, 79, 114; curvature (lordosis) (*see also* Lumbar), 50, 51, 77, 81, 85, 88, 93
Squatting, 88
Stature, 20, 42, 49, 55, 77, 81, 85, 86, 87, 88, 90, 92, 116, 118, 119, 125f.
Steatopygia, 93, 94, 95
Stereoscopic vision, xxiv
Stone Ages (Palaeolithic), stone culture (*see also* Cromagnon, Levalloisian, Mousterian, tools), xiv, xxi, 23, 24, 26, 40, 79, 118, 119f., 121, 122, 123, 124, 125, 126
Strandloopers ('Beachcombers'), 89
Stress, nervous, 8, 22, 35, 36, 112
Stunting, physical, mental, 5f., 35, 114, 115f.
Sudan, 85, 86, 119
Sudd Swamp, xv
Sudeten mountains, xii
Sugar, milk, cane, 30
Sulcus lunatus (see Brain)
Sumatra, 87
Summers, R., 95
Sun, solar radiation, xii, 4, 6, 59, 82, 86, 91
Sunda Islands, Lesser, 99
Surgery, plastic, 30
Survival of the fittest, 42, 100, 102
Sutures, 15, 16, 47, 77, 79
Sweat (*see* Perspiration)
Sweden, 54
Switzerland, 56
Symbiosis, 87

T

Table fork, 26
Tabun, 122
Tail, 13
Tanzania, xv
Tarsiers, viii
Tartars, 66
Taste, 62f., 77, 80
Taxon, taxonomy, vi, 46, 106, 123
Teaching, 23
Tear sac (saccus lacrymalis), tears, 47
Technology, 23, 26, 27, 29, 31, 34, 41, 79, 98, 110, 112, 126
Teeth (*see* Dentition)
Temperament, 42, 112
Temperature control, body (*see also* Climatic conditioning), 9f., 17, 18, 20, 52, 59f., 78, 81, 88, 91
Temples, temporal bone, muscle, 16, 46, 47, 48, 74, 80
Territorialism, 35, 39, 40
Tertiary, x
Testicles, 21, 96
Th, Pronunciation (*see also* Phonetic capabilities), 70f.
Thigh, thighbone, xviii, 88, 93
Third World, 111
Thumbs, 19, 23, 24, 61, 85
Thyroid, parathyroid glands, 42, 63
Tibet, Tibetan, 66, 92, 101, 108
Tierra del Fuego, 66, 72
Timekeeping, biological, 22
Timor, 78
Toes, 19, 61, 116, 119
Tongue, tongue side (labial), 62, 75, 86
Tools (*see also* Stone Ages), xi, xviii, xxi, xxiii, 23, 24, 79, 87, 118, 122, 124, 126
Tortoise, 13
Tribal boundaries, populations (*see also* Breeding isolate), 111; institutions, 102
Tropics, wet (*see also* Rain forest), 37, 68, 86, 88, 90, 92, 117, 119
Trunk, 77, 81
Tungus, 74
Turkey, Turks, 57, 70
Turkic-speaking groups, 99
Turkomans, 99
Twins, 61
Typical and atypical characteristics, 41, 45, 54, 58, 64f.

U

Uganda, 87
Ulcers, gastric, duodenal, 68
UNESCO, xxv
United States of America, 109
Ural mountains, xii, 110
Urbanism, 35, 36, 126
U.S.S.R., 109

Utopia, 112
Uzbekistan, Uzbeks, 99, 124

V

Vagina, 55, 94
Vegetable foodstuffs, 63, 90, 94
Vermin, 36
Vertebrae (*see also* Centrum, Spinal column), 50, 51, 79; vertebral discs, 50, 51, 93
Vertebrates, 14, 15
Victorians, 114
Viscera, 117
Vistula, River, 123
Vorochilovgrad, 124
Vulva, 94, 95

W

Wales, North, Welsh, 69, 70
Wattle, turkey-cock's, 94, 95
Weapons (*see also* Tools), 23, 27, 79, 126
Wellington Island, Chile, 119, 120
'White Australia' policy, 104
World powers, conflict, 108f.
World War II, 69, 105, 110
Wrinkling, dental (*see also* Dentition), xxii, 49, 7
Wrist, 77
Würm I (Last Glacial) (*see also* Glacials), xi, xiv, 78, 115, 117, 121, 123, 125

X

Xenophobia, 104, 105

Y

'Yellow peril,' 110

Z

Zagros Mountains, 124
Zaire (Congo), 86
Zebus, 94
Zoos, zoo animals, zoologists, 35, 62, 118
Zygomatic arch, bones, 16, 47, 73, 80, 107